RAILROAD GAZETTE

FRIDAY, JUNE 14, 1895.

CONTENTS

Contributions.

The Locomotive and the Track.

CHICAGO, May 20, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the matter of counterbalancing, and especially to the ground that has been taken by Mr. Barnes and others, the whole matter of the effect of counterbalancing reciprocating parts by revolving parts may be briefly stated. It is impossible to counterbalance reciprocating parts in this way without introducing a vertical disturbance which materially increases the pressure on the rails over what it would be if this vertical disturbance was not introduced. It is undoubtedly possible to build a track to stand this increased vertical pressure. On the other hand it is not economical to build such a track, and it has never yet been done. If the motive power department wishes to build the cheapest engine possible it is for its interests to use engines of the class now running. If the maintenance of way department wishes to build and maintain the cheapest track consistent with traffic it must get rid of the disturbances now caused by counterbalancing. If the General Manager of a railroad wishes to get the best results from the whole rather than from a single department he must take these two conditions into consideration and the result will be the use of a more expensive locomotive which will make it possible to save enormously in the cost and maintenance of track.

Referring to your editorial comment on this letter (which I have read in manuscript), it is undoubtedly possible to greatly reduce the effect of the excess balance in wheels, but it cannot be eleminated. A man may break his bones by tumbling out of a third-story window. He may be in the habit of tumbling out of a second-story window without breaking his bones; at the same time his bones are subject to a greater risk if he is in the habit of tumbling out of that second-story window than if he is in the habit of going quietly down the stairs. It may also be reasonably expected that his life will be shorter from such eccentric conduct, though it would be impossible to determine how much shorter it would be. It may be impossible to measure what the injury done to rails by moderate excess counterbalancing is; this does not alter the fact that they are injured and worn more rapidly than is necessary.

GEO S. MORISON.

A Rear Collision Under the Block System.

39 *Park Avenue*,
NEW ROCHELLE, N. Y., June 8, 1895.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There was an accident on the New York, New Haven & Hartford Railroad, on June 2, between Harrison and Rye, which raises an interesting question of signaling, and I trust you will consider the following facts of sufficient interest for publication in your valuable paper.

An eastbound freight train was stopped on account of a hot journal; when the journal had been cooled and the train started a coupling failed and the train broke apart, necessitating a second stop. It is said that the flagman then went back, but that he met a following freight train running at 40 miles an hour, before he had gone far. However this may be, the second train ran into the first one, making a bad wreck and injuring two men who were in the caboose.

The operator at Larchmont had to signal the second train, and did so either by a white flag or a white light; the engineer, therefore, had to pass the signal (signal 1) at danger.* He sighted the signal at Harrison (signal 2) at safety, and traveling at speed collided with a train held in block from Harrison to Rye (signals 2 to 3). An explanation is that the whiteflag, or white light, was given at Larchmont because "section clear" was rung up by the Harrison operator. Under the circumstances such a signal should not be acted upon in a positive manner, neither should it have been possible for the Harrison operator to ring up "section clear" while his signal was in the safety position. My patent "Lock and Block" system provides that if a signal is in the safety position no bell or other operator-to-operator signal can be given for block working.

Another explanation is that the operator at Harrison was asleep. If so he could neither unlock Larchmont nor signal "section clear"; therefore the Larchmont signal (signal 1) had to be passed at danger, and the white flag must have been an error. This should be impossible. In a pamphlet I have handed you, which I trust you will think worthy of publication,* appears the following:

"It must be impossible to have consecutive signals at safety. A signal failing to return to danger must lock the immediate rear and advance signals at danger. That is to say: If *B* fails to return to danger, *A* and *C* must be locked at danger. The following rule is then practicable: If an engineer, either by waiting the time limit or by the permit of a clearance card, passes a signal at danger, he must proceed at caution; and, if the next signal is at safety, he must take it as a caution signal. This rule should be readily obeyed by the engineer for the following reason, viz.: He has passed, say signal *A* at danger, and is therefore traveling at caution when he sights signal *B* at safety. The fact that he is traveling at caution reminds him that he passed signal *A* at danger and must therefore take signal *B* as a caution signal. This rule suggests delay to traffic. There might never be a failure, certainly not often, to call for its observance."

Had the engineer of the train which had to pass the Larchmont signal (signal 1) at danger, which we will call train A, been running under the above named rule, he would have taken the signal at Harrison (signal 2) as a caution signal, and avoided the collision.

The same traffic movement is shown in the first track diagram in my pamhlet. (See Fig. 3 below.) We will go a little further and explain why in any system, whether automatic or "Lock and Block," it should be impossible to have consecutive signals at safety. Operator at Harrison asleep, why not operator at Rye also asleep, his signal at safety, and the train (train B) delayed in the block beyond Rye (between signals 3 and 4)? Operator at Rye would have no reminder to place his signal to danger, until operator at Harrison asked Rye to unlock him. Harrison was asleep. The second diagram (Fig. 4) clearly shows how the collision could have occurred beyond Rye (beyond signal 3), and the pamphlet does, I think clearly demonstrate that for safety, a signal, whether manual or automatic, failing to return to danger must lock the immediate rear and advance signals at danger

It may be argued, that had the signal at Harrison been automatic it would have gone to danger automatically. It might, or might not have done so.

HENRY BEZER, Civil Engineer.

* See Fig. 3 in article following, in which 1 may be taken to indicate Larchmont, 2 Harrison, and 3 Rye.

Bezer's Motion and Position Signals.

Mr. Henry Bezer has recently designed two novel railroad signals for which he has applied for patents. He has issued a circular describing them, from which we copy the illustrations, Figs. 1 and 2. Fig. 1 is the motion signal. The semaphore arm is pivoted at its center, upon the end of a horizontal support, and is operated by an electric motor which is placed inside the box behind the semaphore. The motor may be set in operation by a rail circuit apparatus, or other automatic arrangement, or may be operated from a tower. The inventor's idea is to keep the arm in motion, revolving over toward the right, when the line is clear. To the engineman its language is: "If I am in motion you can be; if I have stopped you must stop." The lamp, which may be removed in the day time, shows at night a fixed red light for danger, and an intermittent or flashing red light to indicate all clear.

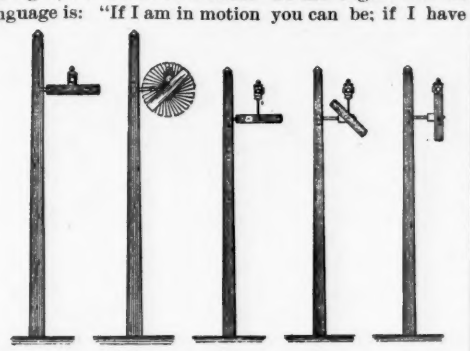


Fig. 1.—Motion Signal. Fig. 2.—Position Signal.

In introducing the element of motion Mr. Bezer claims to make the best possible provision against a bad background; and the flashing light makes the signal very distinct from all surrounding city lights, while at the same time avoiding all danger on account of color blindness. Withdrawal of the power produces a danger signal, without depending upon the automatic action of a weight.

Fig. 2 shows a similar signal, in which the indications are given by position; and by using three positions the inventor is able to equip a series of block signals with only one signal for each section. The position shown at A indicates danger; B indicates that one block ahead is clear; C indicates that two blocks ahead are clear. This signal, like the other, is to be operated by an electric motor. The face of the lamp visible to the engineman is changed by the revolution of the vertical rod supporting the lamp, which turns the whole lamp around so as to show the danger, caution and safety colors to correspond with the position of the day signal.

In both these signals Mr. Bezer does away with the usual counterweight for putting a signal to the danger position by gravity, his argument (which is set forth in the circular referred to) being that by so connecting a series of block signals, that any signal, when in the clear position, shall always lock in the danger position the signals each way from it, he removes the necessity for the automatic return of a signal to danger when there is a failure of any part. Moreover, it is argued, a counterweight is not infallible.

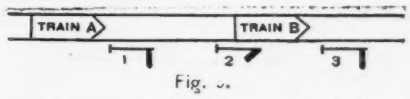


Fig. 3.

Mr. Bezer's argument for the necessity of thus interlocking the signals at neighboring towers is illustrated by the diagrams Figs. 3 and 4, and the conditions shown in Fig. 3 are illustrated by the actual instance referred to in his letter printed on this page, the white flag spoken of in that account being equivalent to the clearance card mentioned in the argument.

The chief clause of the circular is quoted in the letter. In addition to that Mr. Bezer declares in favor of automatic signals, though he does not abandon the principle that a wholsome check upon enginemen is necessary. To provide this he advocates the establishment of towers about every third block.

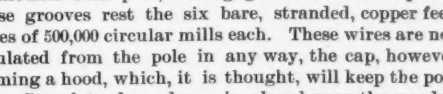


Fig. 4,

In explaining Fig. 4 he says:

"If 2 did not lock 3 at danger the conditions might be as shown in the drawing. The engineman of train A might obey a rule requiring him to continue at caution past 2, but on sighting 3 at safety he would be entitled to put on speed, and might collide with train B. If the failure of 2 to return to danger locked 3 at danger, which would be certain with my system, train A would pass 3 at caution and would not collide with B. Consecutive failures may be improbable; they are, nevertheless, possible. . . . If the locking did not extend to the advance signal, train B might leave at safety any number of consecutive signals. No rule could be formulated for an unknown quantity; but by locking the immediate rear and advance signals at danger, the error of a signal failing to return to danger is so located that the rule is positive."

Mr. Bezer's address is 39 Park avenue, New Rochelle, N. Y., where he has tested the signals in the various weather conditions of the past winter. The signals can be seen there by appointment.

* We have not space for the pamphlet, but give its main points in an article published herewith.

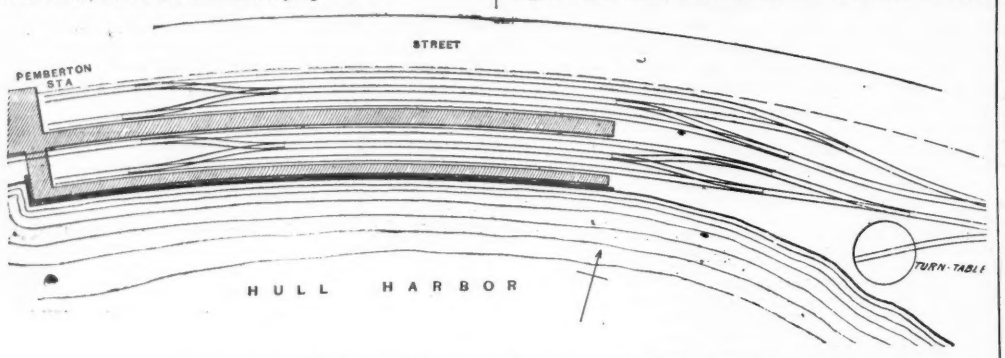
Trolleyizing the Nantasket Beach Railroad.

This branch of the New York, New Haven & Hartford Railroad extends from Old Colony House station, on the South Shore line, to the Hotel Pemberton at the extreme end of the long narrow peninsula, part of which is called Nantasket Beach. This line, which is shown on the accompanying map, is 6.91 miles long; of this, 4.4 miles is curve. In the first mile, out of Old Colony House, the grade is 34 ft. to the mile, after which the remainder of the line is practically level. The line was originally built in sections by different companies, which afterward consolidated into the Nantasket Beach Railroad Co. This was subsequently absorbed by the Old Colony road. The line was laid with 56-lb. rails only three years ago, but is now being entirely relaid with 70-lb. rails, stone ballasted. Along the line there is about 800 ft. of trestle bridges, this is in two bridges, the one on an 8-deg. curve, the other at the end of a 7-deg. curve. There is, in addition, a short plate girder, near Stony Beach station. On the entire line there are 907 deg. 9 min. of curvature. The sharpest curve is 10 deg. and there are about 20 curves on the line. The new tracks have been laid 15 ft. c. to c. with ties spaced about 3,000 to the mile. Poles for supporting the trolley wires have been erected between the tracks. These poles are of Southern pine, 30 ft. long, 12 in. × 14 in. at the butt, and 10 in. × 12 in. at the head. They are placed every 60 ft. on curves, and every 90 ft. on tangents. A petticoated cast iron cap surmounts each post, having grooves in the top. In these grooves rest the six bare, stranded, copper feed wires of 500,000 circular mills each. These wires are not insulated from the pole in any way, the cap, however forming a hood, which, it is thought, will keep the pole dry. Complete dependence is placed upon the wooden pole for insulation, there being no other provision for it. The poles are set in wooden boxes, filled with concrete, and are set toward the inside track on curves. This will throw the trolley wire over to provide for the angle of the trolley pole caused by the elevation of the outer rail. This elevation is 1 in. to 1 ft., or about 4.8 in.

The trolley wire is supported at each end of an iron cross arm composed of two 2-in. × 3-in. angles, which are bolted across the post, one on each side and bent in and bolted together at the ends. Iron rods from the cap to the ends of the cross arms keep the latter from sagging. The trolley wire is of 433,000 circular mills capacity, and in section resembles the figure 8, the lower

lobe, however, being the larger. It weighs about 1 lb. to the running foot. The trolley wheel used will be large, and the pole of necessity very long, since the trolley wire is 22 ft. above the rails. This length will make it impracticable to shift the poles, and two will therefore be provided, one for running in each direction.

The posts, as we have said, are set in concrete; and are 60 ft. c. to c. on curves. Where there is a cross-over, the posts are about 180 ft. apart, and side posts are used, carrying an iron truss over the track, supporting the feed wires, which are laid directly upon it.



Arrangement of Tracks and Station at Pemberton—Nantasket Beach Line

On the trestles, the posts are carried down through the trestle floor and bolted to cross timbers which in turn are fastened to the piles. Blocks, placed between the two inner guard timbers and the post, hold it firmly in place.

There were some difficulties met in putting in the second track. Near Old Colony House, 6,000 yds. of rock ledge had to be taken out. Near Pemberton, that is, between Pemberton and Stony Beach (see map), a heavy retaining wall, half a mile long has just been compleated. This wall was necessitated by the character of the sloping bank on the shore side of the line. In some places this is 100 ft. high and being of a peculiar kind of clay, it runs with about the consistence of mud at certain times of the year, and yet when baked by the sun, or frozen is so hard that it has to be blasted. This was actually done, ahead of the steam shovel, used in excavating for the wall. The wall varies in height from 6 to 21 ft., and the ratio of the base to the height is 0.8. It contains 6,000 cu. yds. of masonry. As evidence of the rapidity with which the work on this wall has been carried on it is of interest to note that 300 tons of stone a day were often laid.

Opposite this retaining wall is a second retaining wall, on the sea side of the line. This wall is fully three-quarters of a mile in length, varying in height from 8 to 15 ft. and in thickness from 10 to 15 ft. This section of the line was formerly a trestle, which has since been filled in, the trestle not having been removed.

The bonding of the track is the General Electric bond, consisting of a stranded copper 0000 wire, 7 in. long, each end soldered to a copper rivet with silver solder. There are two bonds to each rail. The rivets are riveted into countersunk holes of $\frac{1}{8}$ in. diameter in the flange of the rail. The voltage of the line will be 700 at the power house.

The trains to be run over the line will consist of open cars with a baggage car at the head of the train. Of these cars four baggage cars and six open cars have been ordered, the former being fitted with a cowcatcher at each end. Two of them have two motors on each truck, or four in all, giving 8,000 lbs. draw-bar pull. The other two will have only two motors each. The motors are of the G. E. 2,000 type, with a nominal capacity of 100 H. P. each, and there are two of them to each open car, giving 4,000 lbs. draw-bar pull. The cars are controlled by a series-parallel controller of the General Electric Co.'s make. Air-brakes will be provided, run by special motors. The trains run will be of two kinds, accommodation and express. The express trains will be hauled by the baggage car locomotives, while the accommodation "trains" will usually be single open cars. The baggage cars will have their tractive power increased by the heavy loads of baggage carried, and should pull the light trains which will be run, without any trouble. We described and illustrated the motor trucks which will be used on this line in the *Railroad Gazette* for May 10.

There are at present 10 stations on the line, all of which will be rebuilt, with the exception of the one at Stony Beach. It is intended to run both accommodation and express trains, and many smaller stations will be put in, so that stops can be made approximately every quarter mile. The express trains will stop only once between Old Colony House and Pemberton that is, at Nantasket Beach. This station, which is now partially completed, consists of two platforms, each 250 feet long, placed between the tracks, and roofed over. There is also the same length of platform uncovered, on the outside of each track, which gives in all 1,500 lineal feet of platform space, all of which will be needed in handling the large crowds of excursionists which come to Nantasket Beach from Boston, Providence, Worcester and other neighboring cities and towns An eight-tracked yard will also be built at Nantasket and the land for this has been secured. Trains will be run during the winter, as well as the summer, though not, of course, on the same schedule.

The power-house for the line is located at a point about one mile from Old Colony House station, as shown on the accompanying map. Its foundation rests upon an underlying ledge of rock, making it particularly solid. The building is 79 ft. × 106 ft., inside walls. The engine and boiler-room are each 79 ft. × 52 ft., there being a 24 in. dividing wall. It is of red brick, with stone trimmings, and has a slate roof, upon steel roof trusses. It is lighted by electricity, and the engine-room is provided with a traveling crane, of 53 ft. span. At the height of the crane, the dividing wall has been reduced in thickness, and thus a crane with this length of span is possible.

There are eight boilers in the building in two batteries of four each. They are horizontal flue boilers, 72 in. in diameter, and 19 ft. long, with 140 3-in. tubes. The shells are of $\frac{1}{2}$-in. steel, with $\frac{5}{16}$-in. heads. Joints are butt strapped and double riveted. There are five $1\frac{3}{4}$-in. stay bolts, running the length of the steam space, and upset at the ends. There is a 115-ft. circular brick stack, 13 ft. in diameter at the base. This stack was erected in 11 days of 10 hours each, plus 6 hours, which was a remarkably quick piece of work. The boilers are suspended from steel I-beams, resting on the brick side walls. Hangers from the beams are attached to staples riveted to the sides of the boiler. The nominal rating of these boilers is 185 H. P. each, but they will generate 350 H. P. each, under 125 lbs. steam pressure. These boilers have been set, and the boiler-room is getting into shape for work.

In the engine-room will be placed two direct coupled generators, of 1,500 amperes each, made by the General Electric Co. These generators will furnish current to the line at a pressure of 700 volts. They are coupled to two Green-Corliss tandem compound condensing engines, with independent condensers. These engines are set on a heavy $3\frac{1}{2}$ in. iron bed plate, placed directly upon the brick pier, grout being run under the plate when setting it. The arrangement of the engines with reference to the boiler room admits of short steam piping. The space in the engine-room has been admirably utilized.

The switch board is excellently situated at the front of the building, and is so placed that it is possible to go behind it, for purposes of repair, etc. It is of slate, containing panels, for the generators, for ammeter and wattmeter connections, and for the electric lighting circuits. Connection will be made to the nearest pole outside, by means of a lead-covered cable, laid in $3\frac{1}{2}$ in. drain pipe, in concrete. This will lead to a junction box at the foot of the pole.

Fig. 2 shows the arrangement of stations and switches at Pemberton, the extreme end of the line. Here the trains will come in, with the baggage car at the head of them. This car will then uncouple and run up on the gauntlet switch so as to reach the other end of the train for the return trip. At Old Colony House practically the same system is carried out at the junction with the South Shore road. The name of the station will be changed to Nantasket Junction after June 16.

The country in the vicinity of Nantasket Beach and, in fact, all along the line of the present road, is becoming more and more popular as a place of permanent as well as summer residence. Many new houses are being built, about 150 being in course of construction this season along the line. The beach is a favorite resort for Boston people, and its proximity to Boston makes it particularly accessible. The station at Pemberton is only 4 miles, in a direct line, from the State House in Boston. Steamers now make the trip inside of an hour. Excursionists will particularly patronize the new line on account of the cool and pleasant ride afforded, directly along the line of the beach, while the summer concerts at Nantasket attract immense crowds, a smany as 50,000 people sometimes being there during an evening. This should make the line a paying one. We are indebted to Mr. Curtis, Chief Engineer of the New York, New Haven & Hartford, and to Mr. Pearson, Assistant Engineer, for information and drawings used in preparing this description of the line, as well as to Colonel Heft, who has charge of the electrical work.

Map Showing Route of Nantasket Beach Electric Railroad.

Two Pittsburgh Compound Locomotives.

The Pittsburgh Locomotive Works have found that the simple starting gear which they put on their compound locomotives is adequate for all practical conditions, and those who have used it, including the Pennsylvania Railroad, speak very highly of it. It is probably the simplest of all the gears used, in which there is a separate exhaust for the high-pressure cylinder, and was illustrated in the *Railroad Gazette*, Sept. 29, 1893, page 714.

The two locomotives shown by the illustrations have this gear. The eight-wheeler is a passenger engine with 19 and 29 × 26-in. cylinders, and 72-in. driving wheels, and has been in operation about 15 months. We understand that recent tests made with this engine, show that on the round trip of 286 miles between Chattanooga and Birmingham slightly less than 5½ tons of coal was used. The maximum grade is 52 ft. per mile for about four miles, and the train consists of seven cars, postal, baggage, two coaches and three sleepers, all vestibuled. The time is 143 miles in 3 hour and 45 minutes, including three stops.

The experience with the eight-wheeler was so satisfactory that last December the Alabama Great Southern bought the Pittsburgh "tramp" compound No. 1370 on its return from experimental work on the Pennsylvania Railroad. This is the freight 10-wheeler shown in the illustration. It is the first compound built by the Pittsburgh Locomotive Works. On account of grades the engine is able to haul but 700 tons over the line, and uses about 4½ tons of coal in running 143 miles.

The experience with No. 115, during its 16 months of service, has been most satisfactory, no changes or adjusting of compounding apparatus having been found necessary. The freight engine, now No. 116, the first compound built by thePittsburgh Company in the summer of 1892, has been tried on many roads, and has left a good record wherever it has been. No changes have been found necessary in this engine, and the builders say that in building an other to-day for making a record they would not depart from it in any important detail. The table gives the more important dimensions.

DIMENSIONS OF PIETSBURGH COMPOUNDS.

	Eight Wheel Passenger.	Ten-wheel Freight.
Fuel	Bituminous coal	Bituminous coal.
Gage of track	4 ft. 8½ in.	4 ft. 8½ in.
Total weight of engine in working order	112,500 lbs.	120,200 lbs.
Total weight of engine on drivers	72,000 lbs.	95,000 lbs.
Driving wheel base of engine	8 ft.	11 ft.
Total wheel base of engine	22 ft. 6 in.	21 ft. 8 in.
Total wheel base of engine and tender	47 ft. ½ in.	48 ft. 8½ in.
Height from rail to top of stack	15 ft.	14 ft. 6 in.
Cylinders, high pressure, diameter and stroke	19 × 26 in.	19 × 26 in.
Cylinders, low pressure, diameter and stroke	29 × 26 in.	29 × 26 in.
Piston rods	Steel, 3½ in. diam.	Steel, 3½ in. diam.
Type of boiler	Reduced shell.	Straight.
Diameter of boiler at smallest ring	58 in.	60 in.
Diameter of boiler at back head	67 in.	62¼ in.
Crown sheet supported by radial stays	1⅛ in. diam.	1⅛ in. diam.
Stay bolts, 1 in. diameter, spaced 4 in. from center to center, for both locomotives		
Number of tubes	240.	240.
Diameter of tubes	2 in.	2 in.
Length of tubes over tube sheets	10 ft. 10 in.	12 ft. 5½ in.
Length of firebox inside	96 in.	108 in.
Width of firebox inside	40⅜ in.	31¼ in.
Brick arch	Supported on tubes.	Supported on tubes.
Working pressure	180 lbs.	180 lbs.
Kind of grates	Cast-iron, rocking	Cast-iron, rocking
Grate surface	26.8 sq. ft.	25.6 sq. ft.
Heating surface in tubes	1,353.8 sq. ft.	1,555.0 sq. ft.
Heating surface in firebox	123.17 sq. ft.	159.0 sq. ft.
Total heating surface	1,476.95 sq. ft.	1,711.0 sq. ft.
Diameter of driving-wheels outside of tire	72 in.	56 in.
Diameter and length of journals	8 × 10 in.	8 × 9 in.

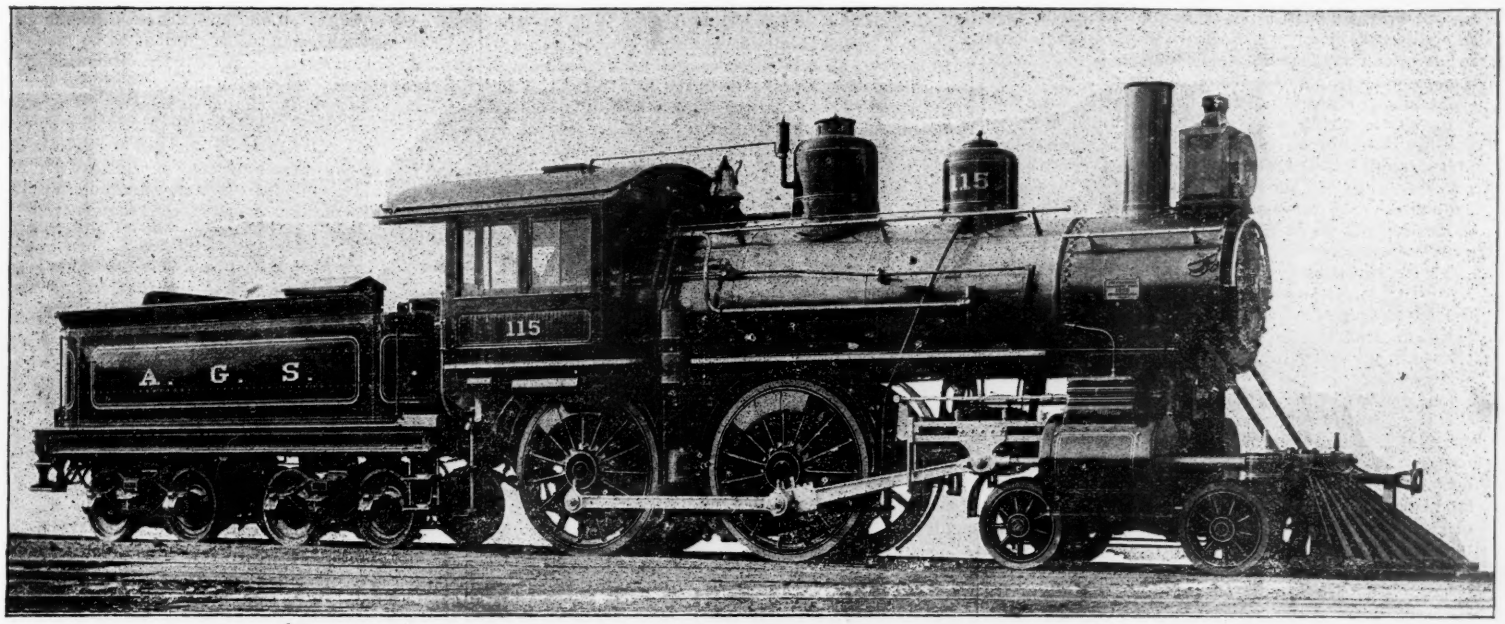
	Eight-Wheel Passenger.	Ten-Wheel Freight.
Diameter of truck wheels	33 in.	28 in.
Diameter and length of journal	5½ × 10 in.	5 × 9 in.
Type of tank	Level top.	Level top.
Water capacity	3,500 U. S. gallons	3,500 U. S. gallons.
Weight of tender with water and fuel	73,770 lbs.	68 000 lbs.
Fuel capacity	280 cu. ft.	280 cu. ft.
Type of brakes	Westinghouse Automatic for both locomotives	
Westinghouse train signal on passenger locomotive		

A New Type of Locomotive.

The Balanced Locomotive & Engineering Co., of No. 1, Broadway, New York, is building a novel locomotive by reconstructing the Strong locomotive that was built some years ago—the No. 1, built for the Strong Locomotive Co. The change will be made principally in the axles, valve gear and cylinders. The same boiler will be used and the steam pressure will be 185 lbs.

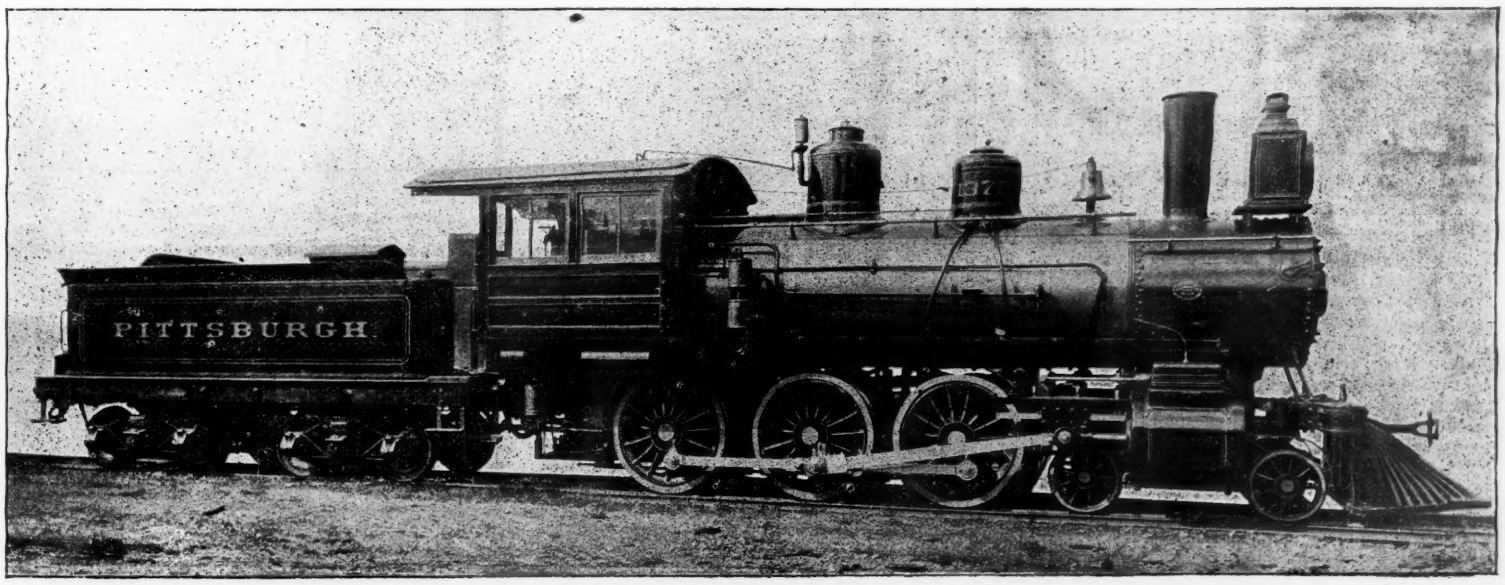
The valve gear will be a modification of the Walschaert, so arranged that one valve gear answers for both the high and low pressure cylinders, of which there are two each, or four cylinders in all. The travel of the high pressure valve is entirely independent of the low pressure valve, so that the steam will only be cut off on the high pressure cylinder. The object of this is to overcome the difficulties incidental to hooking up the valve gear on high and low pressure cylinders, and in this way it is hoped to make a compound that will run as freely as a non-compound. The steam is to be superheated before entering the high pressure cylinders, and is to be reheated between the high and low pressure cylinders by the Strong multitubular reheaters. It is expected to get a locomotive that will run for 18 lbs. of water per H. P. hour.

The high and low-pressure cylinders are near together



Compound Passenger Locomotive—Alabama Great Southern Railroad.

Built by the PITTSBURGH LOCOMOTIVE WORKS, *Pittsburgh, Pa.*



Compound Freight Locomotive—Alabama Great Southern Railroad.

Built by the PITTSBURGH LOCOMOTIVE WORKS, *Pittsburgh, Pa.*

on one side of the engine and as the reciprocating parts are very light it is expected that the engine will be practically free from "nosing" or lateral oscillation when without any balance for the reciprocating parts. As soon as the engine is completed it will be thoroughly tested at Purdue University. The primary object in constructing this locomotive is to make a perfectly-balanced engine, and it is hoped also to get a gain from compounding. This plan of making a more perfectly-balanced locomotive was described in the *Railroad Gazette* Feb. 22, 1895, page 117.

Pooling Locomotives.

BY MR. T. R. FOSTER.

Within the last few years the general depression in business, and, in consequence, the decreased earnings, have forced economies on railroads that had hitherto been thought unnecessary, or even undesirable. The motive-power department has felt this pressure not less than other departments, and every energy has been bent toward decreasing operating expenses. The use of fuel and oil is more closely watched each year, and simplicity in design and construction is encouraged, in order to reduce as much as possible the cost of repairs. The elaborate finish, on which much money was spent but a few years ago, is giving place to a cheaper finish, more in keeping with the service required. Brass work is no longer highly finished, planished iron jackets are being replaced by painted sheet iron, and one road is turning out engines with one coat of bridge paint, showing well the tendency to go to no expense that does not assure some useful return.

One element of economy in the locomotive department, however, has not received the attention it deserves, and the adverse opinions of it, so generally held, are not justified. I refer to the pooling of locomotives, and will present in the following some of the advantages to be derived from this plan of running engines, and comment briefly on some of the points that should be observed in connection with it. I will take as my text figures from the performance sheet of a prominent Western road, covering the year 1892, and comparing two divisions, on one of which each engine has its own crew, while on the other most of the freight engines were pooled, and many of the passenger engines were double-crewed. These figures are presented in tabular form below.

COMPARATIVE PERFORMANCE OF LOCOMOTIVES POOLED AND NOT POOLED.

		No. of Engines.	Average miles per engine.	Cost per mile for miscellaneous material and small stores.	Cost per mile for oil and waste.	Cost per mile for Fuel.	Cost per mile for Wages.	Cost per mile for Repairs.	Total cost per mile.
Division A.	Engines not p'l'd	129	35,061	Cts. .27	Cts. .18	Cts. 4.57	Cts. 6.77	Cts. 4.39	Cts. 16.18
Division B.	Engines p'l'd	175	50,179	Cts. .21	Cts. .23	Cts 5.97	Cts. 6.76	Cts. 4.71	Cts. 17.88

It will be observed at once that the mileage of engines on division B is remarkably good, while that on division A is good compared with the average mileage made by engines on American roads. From these figures it will be seen, that, had the engines on division B made no better mileage than those on division A, 75 more engines would have been required. It must be noted, however, that there are more switch engines on division A than on division B, and the runs in general are shorter, both of these facts tending to reduce the average mileage. Even were the engines on the two divisions run under the the same system, the average mileage on division B would be greater. Making due allowance for this, and by comparing the wages of the enginemen, or the mileage made by them, with the mileage made by the engines, it is found that the actual number of engines saved is about 40. The above table is given to show, not so much the difference in average mileage on the two divisions, as to compare the cost of operating the engines, and to this reference will be made later.

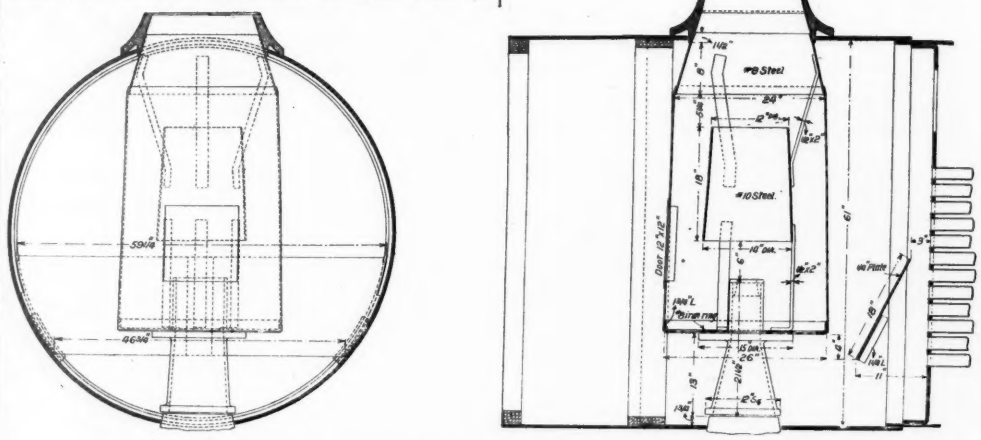
On division B 40 heavy road engines were saved by pooling, assuring the following saving to the railroad company:

Saving on investment	$400,000
Annual saving, interest 6 per cent.....	$24,000
" " depreciation 8 per cent.....	32,000
	$56,000

This is a very considerable saving, and will perhaps be made even more apparent by the following comparison. By referring to the table above it will be found that the cost for fuel on division B was $524,246 for the year, so that the saving effected by pooling is equivalent to a saving of over 10 per cent. in fuel. We would feel well repaid if the attention and energy that has been directed toward reducing the cost of fuel should bring about results as good as these.

Engines that are run in a pool require closer supervision on the part of master mechanics and foremen, especially when the system is first inaugurated, and it is due to poor management that in so many instances pooling has proved unsatisfactory. The system is, however, capable of fine adjustment, and when properly handled has merits aside from the saving already noted. A few men can be made responsible for the condition of the engines in place of many. The number of men in a pool should be governed by the business, and when the latter increases beyond a certain point crews can be added from the extra list, precluding the possibility of men being overworked. On the other hand, as business falls off the younger men in the pool can be put on the extra list, so that the older men, to whom more consideration is due, shall still make good wages. In fact the wages of the men can be kept very nearly constant the year around. An engine can be taken out of service at any time for light or heavy repairs without interfering with the work of the men, who should always be governed by the "first in, first out" rule. The crews should be kept on the same runs, but the engines can be sent in the direction where first wanted, and a light or heavy engine furnished as required.

It is generally asserted that the cost of maintenance is greatly increased when engines are run in a pool, but the facts do not bear this out. The cost of repairs per mile on division B exceeds that on division A by $\frac{3}{100}$ cents or about 7 per cent, an increase that can be traced to other causes. This increase, as well as the increase in the cost of fuel and oil, is due to the fact that all of the engines on division A, switch engines and eight-wheeled road engines, while on division B over 25 per cent. of the engines were heavy Moguls. These engines pulling heavier trains, naturally show a greater cost per train mile, although the cost per unit of useful work done may be less. In fact, as far as the use of fuel and oil is concerned, it has been shown that the economy of engines on division B is greater than that of engines on division A, a comparison of the actual work done being made. And there is no question but that the cost of repairs, based on a similar comparison, was less on division B than on division A. Again referring to the table, it is found that the average cost of repairs per year for engines on division A amounted to $1,529 each, and on division B it amounted to $2,364 or 53 per cent. greater. Although the cost of repairs on each engine on the latter division was very much greater—on account of the increased work performed, the cost of repairs per mile was close to that on division A. When engines are run in a pool, the running repairs are increased, and they go to the shop oftener for general repairs, and without considering carefully the increased useful work accomplished, it is easy to fall into the common error of concluding that the cost of maintenance is largely increased. The engines certainly wear out faster, but during the shorter time they are in service they do a proportionately larger amount of work.



Smoke-Box and Deflector Plate—Lehigh Valley Railroad.

Look at the matter from another point of view. The work that is required of an engine crew towards maintaining their engines differs on different roads, but the tendency each year is to have the engine crews do less and the roundhouse force do more, and the work now done by the former cuts but little figure in the cost of maintaining the engine. If it were all done by the roundhouse force, it could be so systematized with other work that little additional help would be required, and that of the cheapest kind. The cost of this additional help, when divided by the mileage, would be small, probably not more than $\frac{2}{10}$ or $\frac{3}{10}$ cents, and in many cases it will be found that the better supervision required will make even this small additional help unnecessary.

When engines are run in a pool it is not expected that the engine crews will do any work on them beyond what is required while they are actually in their charge. They should be given to the enginemen in good order, and when the latter turn them in at the roundhouse at the end of a trip, they should be required to make out a correct report, on blanks provided for the purpose, showing the condition of the engines when turned in. The engines should then be carefully looked over by competent inspectors, and if they find that an engineer's report is not correct, the matter should be taken up with the latter at once. The success of running engines in a pool depends largely on the ability of a foreman to keep track of the condition of the engines in his charge, and this he can only do by getting correct reports from the engineman, and the latter must be constantly checked up by the inspectors. It is a good plan to have the work reports, made out by the engineman, handed over immediately to the inspectors, who should promptly look over the engines. The reports should be O.K.'d or corrected by them, and then go to the foreman.

Perhaps the greatest difficulty in running engines in a pool is to keep intelligent coal records. The records of coal used by individual engines is only of value in determining the relative merits of different classes of engines, but to insure the greatest economy in the use of fuel it is necessary to keep records against the different crews. When a crew gets a different engine each trip, it is more difficult to keep individual records than when each crew has a regular engine. This can be done, however, by insisting that each crew when they leave an engine shall leave it with a full tank of coal, that is, leave as much coal on the tank as there was on it when they took the engine. A better plan is to keep track of the coal issued to each crew during each trip, and measure the coal left in the tanks at the end of each trip. This involves a little more work, but it will usually be found that this work is well spent.

The use of oil can be readily checked up by providing each crew with a set of oil cans. These cans should be substantially made and so designed as to be easily carried. Provision should be made in the oil house for taking care of them. On coming in from a trip the fireman takes the cans from the engine and leaves them at the oil house, where they remain until this same crew goes out again. Any oil left over at the end of a trip is thus saved for the use of the same crew on the next trip. Oil can thus be charged out to each crew and individual records kept. By issuing a set of cans to each crew they last much longer, and the keeping of oil off of engines lying in the house prevents its being used in firing up or otherwise wasted.

In the same way it will be found a good plan to furnish each engineman with a small tool box, which he can carry about with him from engine to engine. This box can contain all of the small tools required, such as wrenches, hammers, cold chisels, etc. A place should be provided where these boxes can be kept while the enginemen are off duty. This plan will greatly diminish the loss of such tools, and enginemen can be held responsible for having them with them every trip. The heavier tools should be kept on the engines and inspectors should see that the equipment is kept up. These tools are less often used than those carried by the engineman and the boxes in which they are kept can be sealed. The inspector then need only examine the equipment when he finds the seals broken, and lost tools can be traced by means of the broken seals.

The saving effected by pooling engines is not one that appeals directly to the officers of the motive power department. It does not make a better showing on the performance sheet, their usual guide, but, on the contrary, they have generally believed that a poorer showing would be made. Although this need not be so, it is not surprising to find few master mechanics who advocate the system of pooling. Local conditions will largely determine the advantages to be derived from pooling, and in some cases a greater saving can be made than here shown. But with a possible saving as indicated above, a saving of 18 per cent. in the equipment, equivalent to a saving of 10 per cent. in fuel, the matter is of sufficient importance to demand more attention than it has hitherto received. Some roads have been forced to pool their engines during short periods when a temporary increase in business has caused a shortage of engines. Under such circumstances the plan has not been handled systematically, and in many cases not even intelligently. Such experiments have resulted in much trouble, tending to make the plan unpopular. Properly managed, there is no question as to the success of the system, but it can be easily made a failure by poor supervision.

Lehigh Valley Smokebox.

The smokebox shown in the illustration was arranged by Mr. Higgins for the locomotives on the Lehigh Valley Railroad. The length of the box is within the recommendation in last year's report of the Committee on Exhaust Apparatus appointed by the Master Mechanics' Association two years ago. The recommendation was that the smokebox should be no longer than is necessary to put in a satisfactory cinder pocket ahead of the cylinder saddle. The arrangement of the spark arrester is peculiar and is reported to be very efficient. The exhaust nozzle is low and there is a draft pipe arranged above it as shown. The deflector plate is located in front of the lower tubes. The construction is so clearly shown by the illustration that it is not necessary to say more about the design except to add that the device has been used enough to show that it makes the engine steam well and the draft is so strong that a 3¾-in. double nozzle can be run on an 18 × 24 in. locomotive.

Railroad Legislation in Massachusetts.

During the past year there has been little, if any, radical legislation passed in Massachusetts affecting either the steam railroads or the street railways. The state has maintained its policy looking to the abolition of grade crossings and legislation was passed looking to that end. The railroad and street railway committees of the general court have not reported any measures calculated to impair the strength of the corporations, though many were introduced and heard by them. These committees were sustained in practically all of their reports.

Chapter 362, an act to require locomotives and cars to be equipped with certain safety appliances, is simply in the line with the Federal coupler law.

Of the more important measures killed during the year were the petitions for mileage tickets, for uniform passenger rates on all the railroads of the Commonwealth, the bill to compel the West End Street Railway of Boston and vicinity, to furnish free transfers, and the bill to compel the New York, New Haven & Hartford to operate the ferry across the Acushnet River between Fairhaven and New Bedford.

Chap. 426 forbids the crossing of street railways and steam railroads at grade. It enacts that no street railway shall hereafter be constructed across the tracks of a team railroad at the same level therewith without the consent of the railroad commissioners or a special commission to be appointed by the superior court when petitioned for. In applying for such permission the street railway may petition either the railroad commission or the special commission at its option. Nor can the railroad cross the railway's tracks without the same consent. The act does not affect the case where permission has been granted previous to its passage for a street railway to cross a railroad; "provided said street railway shall be actually constructed across the railroad within twelve months after and provided further that the foregoing proviso shall not affect any case in which the street railway is in process of actual construction at the time of the passage of this act."

Chap. 484, an act to provide for the incorporation of purchasers of the property and franchises of the New York & New England Railroad, simply amends the law passed last year to make it conform with the legislation on this subject in other states.

Chap. 491 provides for a commission to look into the expediency of abolishing all the grade crossings in East Boston.

Chap. 362, before referred to, an act to require locomotives and cars to be equipped with safety appliances after Jan. 1, 1898, does not apply to flat cars which are passed on account of the proximity of a crossing of the New York, New Haven & Hartford, whose tracks will have to be raised to admit of the proper adjustment of the grade of the Boston & Albany.

Chap. 356 is an act to authorize railroad corporations to file a location of lands purchased for railroad purposes. This shall not operate to prevent land thus located from being assessed for taxation in the city or town where the same is situated.

Chap. 316 is an act authorizing street railways to acquire and hold real estate to be used for purposes of recreation and for pleasure resorts. Admission to such grounds must be free and no intoxicating liquors can be sold on the premises. Street railway companies may, with the consent of the railroad commissioners, increase their capital stock and issue bonds to the amount deemed necessary by the commissioners, not exceeding $100,000 in the case of any one railway company, for the purpose of acquiring real estate for the purpose mentioned.

Chap. 378 provides that street railway companies operating cars propelled by any motive power other than horse power shall equip their cars with such fenders and wheel guards as the railroad commissioners may require. It shall be the duty of the board, within three months after the passage of this act, to notify the street railway companies of its requirements, and any such company neglecting, for a period of three months after such notification, to comply with the requirements, shall forfeit $50 a day. This act was approved May 14.

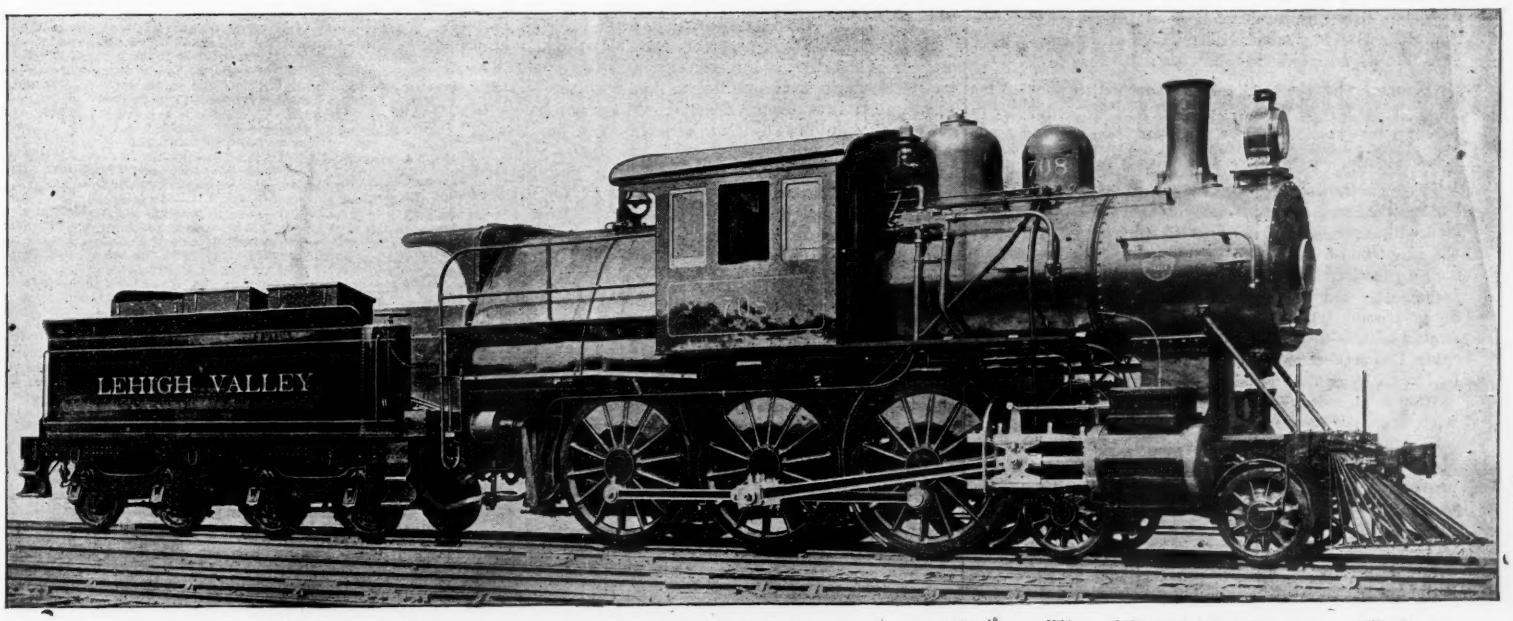
Chap. 135 extends the time for the construction of the Fall River electric freight railway till July 1, 1897.

Chap. 136 is an act providing that the railroad commissioners shall require street railway companies to heat cars when in use for the transportation of passengers, at such times, by such means and to such extent, as the commissioners shall determine. There is a penalty of $25 for each trip run by any car not heated as provided. This takes effect Nov. 1, 1895.

Lehigh Valley Tenwheeler.

A ten-wheel locomotive, recently designed by Mr. Higgins for the Lehigh Valley Railroad for fast freight or heavy passenger service, is shown by the illustration. This engine has a number of interesting details which we hope to show later. The following are the general dimensions:

Fuel	Anthracite
Weight on drivers	108,500 lbs.
" " truck wheels	30,000 lbs.
Total weight in working order	138,500 lbs.
Total wheel base	22 ft. 11 in.
Driving wheel base	12 ft.
Total wheel base engine and tender	50 ft. 11¼ in.
Length over all, engine	36 ft. 11 in.
" " " total, engine and tender	60 ft. 8 in.
Height, center of boiler above rails	8 ft. 10½ in.
" of stack above rails	14 ft. 10 in.
Heating surface, firebox	157 sq. ft.
" " tubes	1,758 sq. ft.
" " total	1,915 sq. ft.
Grate area	67.8 sq. ft.
Drivers, number	Six
" diameter	68 in.
" material of centers	Cast iron
Truck wheels, diameter	33 in.
Journals, driving axle, size	8½ × 10 in.
" truck, " "	5½ × 9 in.
Main crank pin, size	5½ × 5½ in.
Cylinders, diameter	20 in.
Piston, stroke	24 in.
" rod, diameter	3¼ in.
Kind of piston rod packing	U. S. metallic packing
Main rod, length center to center	9 ft. 8½ in.
Steam ports, length	17 in.
" " width	1¾ in.
Exhaust ports, length	17 in.
" " width	3 in.
Bridge, width	1⅜ in.
Valves, kind of	Richardson Balanced
" greatest travel	5¼ in.
" outside lap	⅞ in.
" inside lap or clearance	— in.
" lead in full gear	1/16 in.
Boiler, type of	Wide firebox
" working steam pressure	160 lbs.
" material in barrel	Carbon steel.
" thickness of material in barrel	7/16 in.
" diameter of barrel	61 in.
Seams, kind of horizontal	Butt-jointed, with double covering strips
" " circumferential	Double riveted lap
Thickness of tube sheets	½ in.
" crown sheet	7/16 in.
Crown sheet stayed with	Radial stay bolts, 1⅛-in. diam.
Dome, diameter	31½ in.
Tubes, number	248
" material	No. 11 W G iron
" outside diamater	2 in.
" length over sheets	13 ft. 7⅛ in.
Firebox, length	9 ft. 11 1/16 in.
" width	6 ft. 10 in.
" depth front	50¾ in.
" " back	47⅛ in.
" material	Carbon steel
" thickness of sheets	Crown, ⅜ in.; tube, ½ in.; side and back 5/16 in.
" brick arch?	No.
" water space, width,	4 in.; front, 4 in.; sides, 4 in.; back, 4 in.
Grate, kind of,	Water tubes and shaking grates.
Smokebox, diameter	61 in.
" length	67½ in.
Exhaust nozzle, single or double	Single
" " variable or permanent	Permant
" " diameter, 3 thimbles; each, 4½ in.	4⅝ in., 4¾ in.
" " distance of tip above or below center of boiler	8 in. above center
Netting, wire or plate	Wire netting, No. 13 B. W. G.
" size of mesh	3 x 3
Stack, straight or taper	Taper (cast iron)
" least diameter	14 in.
" greatest diameter	15½ in.
" height above smokebox	3 ft. 4½ in.



Lehigh Valley 10-Wheeler for Freight and Passenger Service.

Some of the special features of this locomotive are: Oil cups forged solid on rods; Consolidated steam heating equipment; McDowell inside safety check valves; steel cab lined with wood; iron pilot; Leach's sand blast for drivers; automatic bell ringer operated by air; Gould automatic coupler, front and rear; consolidated safety valves, 1 muffled; 17-in. round-case headlight; Westinghouse automatic driver, tender and train brakes; American outside equalized driver brake fixtures, 9½ in. air pump and train signals; 10-in. iron tender frame; iron running board; Fox pressed steel tender trucks; and steel tires on tender and engine truck wheels.

The M. C. B. Convention.

The twenty-ninth annual meeting of the Master Car Builders' Association was called to order in the Opera House, Thousand Islands, Alexandria Bay, N. Y., Tuesday, June 11, 1895, at 9:20 a. m., by President John S. Lentz.

The President introduced the Rev. E. H. Kenyon, of Alexandria Bay, who made the address of welcome which was responded to by President Lentz.

President Lentz then read an address, from which we abstract the following:

Since our convention, June, 1894, the association has lost several valuable and well known members in the death of D. Packard, W. T. Small and J. N. Lauder. The latter, though not a member at the time of his death was so closely identified with the association, that we have thought it proper that his name be included in the list of these on whom Committees on Obituary should be appointed.

In the framing of the Constitution and By-Laws of the Association, it was not provided that the proceedings be opened with prayer. It has been suggested that the by-laws be so amended as to provide for the same, and I would so recommend.

Mr. Lentz then said he did not think that amalgamation with the Master Mechanics would be to the best interests of either association. He recommended, to economize time and bring the members more closely together, that the convention meet on Wednesday and continue its sessions until its business be finished, the Sunday intervening between the two conventions being devoted to memorial services and rest.

At the Saratoga convention your secretary read a communication addressed to the American Railway Association, asking its co-operation in urging the adoption of the standards agreed upon by this association; by your direction this communication was forwarded to the American Railway Association, which at a meeting held Oct. 17, 1894, adopted the following:

"*Resolved*, That the details of car construction adopted by the Master Car Builders' Association, as published with the proceedings of its convention held in June, 1894, be and are hereby adopted as standard by the American Railway Association, and all railway companies and car builders are recommended to conform thereto as near as practicable."

By this action the Master Car Builders' Association has received well deserved recognition, by an organization which can, and no doubt will, contribute largely to the adoption of its standards.

The question now arises, are we doing what we can to induce the proper officers of the roads we represent to adopt them? The proper result of the conventions should be the ultimate adoption of all standards.

Mr. Lentz then recommended an amendment to the by-laws, giving the President power to ascertain, after a motion to close any discussion, whether any persons still wish to speak.

In referring to the valuable work of the Association, Mr. Lentz spoke of the many tests made and the improvements in air-brakes, couplers, etc., resulting from the work of the various committees. He further referred to the question of the adoption of the present M. C. B. coupler, and prophesied a long life for it. He then called attention to the revised addition of the "Car Builders' Dictionary" recently published, and predicted among other results from its use, a desirable uniformity in naming parts of cars. Continuing, Mr. Lentz said:

Of the subjects for discussion by this convention, in my opinion two are particularly important, and should have your best attention. I refer to the report of the Committee on Interchange of Cars, and the report of the Committees on Brake Shoe Tests. The former provides for a radical change in our interchange rules, and should therefore be carefully considered and thoroughly discussed before acted upon. The latter may not be of equal importance, but when I say to you that it costs the road which I represent $23,000 a year for brake shoes, you will no doubt conclude, as I have, that it is a subject requiring your earnest attention. . . .

For the future work of the association I am strongly impressed with the importance of appointing a committee to devise plans and specifications of cars of 80,000 lbs. capacity. . . .

The question of adopting a standard truck for cars of 60,000 lbs. capacity is, I think, simplified by the introduction of pressed steel in their construction; the subject should have your careful attention. . . .

Mr. Lentz further referred to the value of having standards for draft gear and trucks, to the question of iron versus steel axles, and the liberality of the present wheel specifications, to car doors and door fastenings, the question of increasing the present standard wheel tread on account of the use of heavier rails, etc.

Mr. Lentz spoke in the highest terms of praise of the value of the railroad clubs as affording a means for interchange of views among railroad men oftener than the yearly convention, and recommended the exchange of copies of proceedings by the several clubs.

After extending hearty encouragement to the Master Car and Locomotive Painters' Association, Mr. Lentz thanked the meeting for their confidence in electing him President.

On motion of Mr. A. M. Waitt, the recommendation of the Executive Committee that the annual dues for the coming year be $5 as heretofore was adopted.

The report of the Secretary showed that the membership list at the present time indicates a gain of 33 over that at the close of the last meeting, it now consisting of

Active	214
Representative	148
Associate	5
	367

Number of cars represented in 1894 1,145,125
Number of cars represented in 1895 1,151,957

The report of the Treasurer showed the receipts during the year had been $8,810.89; the balance on hand is $4,916.22.

The following committees were appointed:

NOMINATIONS.

Messrs. E. W. Grieves, G. W. West, R. E. McKenzie, M. M. Martin, W. S. Morris.

SUBJECTS FOR NEXT MEETING.

Messrs. J. J. Hennessy, S. P. Bush, R. D. Wade, Wm. McWood, John Hodge.

CORRESPONDENCE AND RESOLUTIONS.

Messrs. A. M. Waitt, R. P. C. Sanderson, J. F. Devine.

OBITUARIES.

On Mr. L. Packard, Messrs. H. S. Hayward, W. H. Harrison and F. D. Adams.

On Mr. W. T. Small, Messrs. A. E. Mitchell, James McGee and D. Haskell.

On Mr. J. N. Lauder, Messrs. J. T. Chamberlain, J. W. Marden and W. J. Robertson.

AUDITING.

Messrs. G. L. Potter, W. H. Lewis and Wm. Garstang.

A communication was read from the International Railway Congress inviting the Association to be represented at the forthcoming session to be held in London, England.

On motion of Mr. Mitchell the Committee on Correspondence and Resolutions was instructed to cable Mr. R. H. Wilbur, General Superintendent of the Lehigh Valley Railroad Company, now abroad, requesting him to represent the Master Car Builders' Association at the Congress.

At the invitation of the Railroad Supply men an excursion was arranged for Wednesday, June 12th, at 3 p. m.

The following report of the Committee on Interchange of Cars was then submitted:

INTERCHANGE OF CARS.

This committee took up pretty carefully the matter of revision of the rules of interchange, and the committee was particularly well qualified to deal with the subject. The committee sent out a circular with the purpose of getting an opinion as to the practicability of facilitating movement through interchange points, introducing inspection for safety rather than protection and putting upon owners of cars a greater percentage of the cost of repairs. The questions sent out were: (1) How many car inspectors could be dispensed with if inspection were made for safety only? (2) As to the responsibility of owners, also the idea of making no repairs except for safety. (3) Suggestions as to what would be evidence of unfair usage. (4) As to restriction of the application of the rule to roads of limited equipment. (5) If absolute responsibility of owners is not favored what should be the parts included under Rule 8? (6) As to changing the rule to read: "Owners will be responsible for all defects developing under fair usage, except"—giving exceptions. (7) If these questions do not cover the ground give ideas on the subject regardless of or in addition to the questions.

The replies to this circular showed that 28 companies representing 273,639 cars are in favor of owners' responsibility. Four companies representing 26,923 cars were not in favor. The committee feels safe in asserting that there is a sentiment in favor of placing the responsibility of repairs on owners with exceptions generally in line with those incorporated in the Chicago plan. If it were possible to live up to Rule No. 2, namely, that cars must be delivered in safe running order and returned in as good general condition as when received there would have been no hardship. The whole trouble has been that cars have been rejected for old defects and for blemishes that in no way impaired the efficiency of the car and which would not have been repaired by owners. The committee draws from the replies received the inference that there would be no increase in charges under rules making the owners responsible over the charges now paid, so if the present mileage rate is fair it would still be sufficient.

Answering question (1) the replies range from zero to 50 per cent. At small points the same number would have to be maintained, although they could handle more cars if necessary, and this suggests a point considered by the committee as essential, namely, that Rule 1 should read: "Each company shall give to foreign cars the same care as to oiling, packing and minor repairs that it gives to its own cars."

Answering question (3) it appears to be conceded that the statement on the bill should be accepted. There are those who claim that the opportunity for dishonesty is no greater under full responsibility of owners than now.

The committee sums up by proposing the following modifications: Rule 1, "add 'and minor repairs' after the word 'packing.'" Rule 3, change the opening paragraph to read:

"Cars may be refused for any of the following defects: If in the opinion of the roads they are unsafe to run, or unsuitable for carrying freight, or if they have defects for the repairs of which the receiving roads are not authorized to bill."

Rule 4. Add after the words "crosstie timbers" the following: "Such cards shall not be required for defects for which owners are responsible."

Rule 8. Should be modified to make owners responsible for repairs to their own cars when such repairs are due to ordinary service; with such restrictions as will guarantee owners from loss by unfair usage. Such restrictions have been fully outlined in the recommendations of the various railway clubs to the Arbitration Committee, and in a general way the committee concurs with these recommendations.

A minority report was submitted which we shall publish later.

EXHIBITS.

The exhibits are being rapidly put into position, but at this writing are not complete. The various appliances are scattered about the grounds surrounding the two hotels, one or two exhibits being inside the latter. A tent has been erected on the point of land near the Crossman House, in which a number of the exhibits have been put in place.

These include the exhibit of the National Malleable Castings Company, of Cleveland, O., which shows the Eubank car door, the Tower coupler, and a large variety of malleable cast iron journal boxes, corner irons, post pockets, carline pockets, etc. These pockets were fully described in the *Railroad Gazette* of May 10.

Near this is the exhibit of the Standard Brake Slack Adjuster, made by J. H. Sewall, 100 Main street, Worcester, Mass. It was described in the *Railroad Gazette* of April 19. The exhibit consists of a timber frame, supporting sections of four driving wheels, in position, and the brake rigging for them complete, including the adjuster. This exhibit is arranged in connection with the Chicago Railway Equipment Company, and shows the National Hollow Brake Beam Company's brake beam. In connection with the latter is shown a new self-adjusting spring head, an extended sleeve for strengthening the end of the beam where it is punched, a new finger guard, a self-adjusting third suspension, etc.

The Acme Coupler Co., of New York, has its Acme coupler on exhibition in the tent, the models being so arranged upon trucks on a short section of track, that a run of about 10 ft. can be secured and the action of the coupler in service shown.

Here also is the exhibit of the Patten Self-Oiling Axle and Journal Co., of Baltimore, Md. It includes a model of the journal and oiling device, the axle being driven by a small stationary engine provided for the purpose. It is mechanical lubrication, and is intended to do away with the use of waste.

Between the tent and the pavilion is the exhibit of the Shickle, Harrison & Howard Co., of St. Louis. It includes the cast steel body and truck bolsters of the company, and the M. C. B. coupler, for which they have lately received an order of 2,500 for the Louisville & Nashville. The bolster center and side plates are either bolted to the bolster or cast on, as desired.

The Dumping Car Improvement Co., of 26 Cortlandt street, New York, has on exhibition at the dock a 60,000-lb. dump car, which was brought to Alexandria Bay on a scow, there being no tracks for that purpose. This car is equipped with a patent hopper bottom, using levers instead of chains for operating the gates, and opening by a positive-motion lever, not by gravity. The bottom gates close with a beveled joint, making it possible to employ the car for transporting grain, sand or culm.

On the east porch of the pavilion is the exhibit of the National Railway Spring Co., of Oswego, N. Y. This includes three-coil, graduated, equalizing bar springs, such as are now used on Pullman cars on the Pennsylvania; quadruple bolster springs for 50,000-lb. and 60,000-lb. cars, journal, engine truck, driving and tender truck springs, also double and quintuple elliptic springs. Part of the exhibit of the National Railway Spring Co. was shipped by the private yacht of Mr. Geo. B. Sloan, Jr., secretary and Treasurer of the company, which left Oswego, N. Y., Thursday morning, June 6, at 6 o'clock a. m. Captain Blackburn, of the yacht, was a lake captain 60 years old, who had with him on board an engineer and the shipping clerk of the company. A severe storm was in progress when the yacht left, but the run to Stony Island, about 30 miles, was successfully made, and the yacht lay to in the lee of the island for some time. After leaving here all trace of the yacht was lost, and the special tug sent out by Mr. Sloan from Alexandria Bay when the yacht failed to arrive was unable to find anything at all relating to it. It is now supposed that all on board were lost.

The Consolidated Car Heating Co., of Albany, N. Y., besides its exhibit in the Thousand Island House, described later, has an arrangement of piping for both direct and indirect systems of heating, in the tent, near the exhibit of the National Malleable Castings Co. The direct heating system includes a drip casting arranged so that the train pipe passes through it, preventing freezing. The indirect system crossover drum is to be used in connection with the Baker heater, as has heretofore been done. The details of construction of the drum are new. The water is heated four times during circulation, the hot water pipes inside the drum being corrugated copper or brass. There is also an arrangement showing this company's standard hose connection, now in general use. The exhibit of this company at the hotel consists of a handsome hardwood display cabinet, arranged with five different kinds of lamp, of the Pope lighting system, meters, pipe connections, reducing valve, etc. The gas used is compressed gas of the company's make, brought especially for that purpose.

The Gold Car Heating Co., of New York and Chicago, has an exhibit on the lawn directly in front of the Thousand Island House, showing the various parts of their car heating apparatus under steam. Steam is taken from a steam boiler in the rear of the hotel, and is used to show the actual working of their train pipe valves, steam hose couplings, automatic steam trap, gravity relief trap, etc.

In the pavilion near the Crossman House the following exhibitors have arranged their displays:

The Moran Flexible Steam Joint Company, of Louisville, Ky., show their flexible joint arranged in connection with their steam coupling as applied between engines and tenders on the Pennsylvania Railroad, and also their standard car connections. One of these joints and couplings is shown under steam pressure. A 10-in. ball joint, such as employed in pipe lines beneath water, dredging, etc., is shown and such photographs that have been taken of the various applications of their joints.

The steam for the different exhibits in the tent and pavilon is supplied by the Crossman House boiler, a 9-in. Westinghouse air pump furnishing all the air.

The Peerless Rubber Manufacturing Company, of New York City, have an extensive exhibit of air-brake and steam hose for engine, tender and car connections; Anaconda engine, tender and tank water hose; Peerless spiral piston and valve rod packing; Eclipse sectional gaskets, step treads and mats; Rainbow sheet packing gas hose for Pintsch and Frost systems; Westinghouse rubber gaskets and washers, and pump valves.

The Boston Belting Company, of Boston, Mass., show a large exhibit of rubber car springs, air-brakes, steam car heating, tank, tender and hot water hose; rubber and cotton fire hose; wring hose; Imperial spiral piston packing; rubber sheet packing, gaskets, pump valves, diaphragms, washers and car step treads and ornamental mats.

H. W. Johns Manufacturing Company, of New York City, exhibit asbestos liquid paints, asbestos pipe coverings, asbestos and rubber cloth, abestos fireproof rope; vulcabeston rope packing; asbestos packing and gaskets of various descriptions.

On the dock near the tent the Automatic Injector Co., of Cincinnati, O., have put up a small portable boiler to show the working of their Hogue injector. This exhibit includes the Climax oil injector for injecting kerosene into boilers to remove scale.

The Gould Coupler Co., of Depew, N. Y., also have their exhibit on the dock. It contains the Gould continuous draft rigging for freight cars, set up with two full size center sills, and furnished with the Gould couplers, the Gould passenger coupler, Gould tender coupler and buffer, and Gould pilot coupler and buffer, illustrated in the *Railroad Gazette* for June 7, 1895. In this exhibit is included the Taylor flush car door.

In the Crossman House, the Safety Car Heating & Lighting Company, of New York, have an exhibit of their Pintsch lighting system containing four lamps, including two inverted Argand burners, a deck light, and an ordinary car center lamp with four burners. In two of these the Pintsch gas is used, and in the other two ordinary city gas, compressed in the tanks at Jersey City. The whole exhibit is very prettily grouped with two plate glass mirrors behind the lights.

The exhibit of the Union Grease Company, of Boston, Mass., consists of buckets of gear, marine, car axle, machinery, electric motor, and amber grease. This is inside the pavilion. During the past 30 days this company has received orders from 20 street railroads and 5 steam roads for their grease.

The Damascus Bronze Co., of Pittsburgh, shows side rod and main rod bearings in phosphor bronze and Damascus bronze; also lead-lined journal bearings, and four grades of Babbitt metal as well as a Damascus bronze journal bearing which has made 152,000 miles on the Lake Erie & Western. The present capacity of the shops of this company is 250,000 lbs. monthly, which will be increased to 400,000 lbs. after July 1.

In front of the west porch of the pavilion is the exhibit of the Shoen Manufacturing Co., of Philadelphia, consisting of two pressed-steel, diamond-truck bolsters, and one body bolster.

The exhibit of Wm. S. Soule & Co., on the porch of the pavilion, consists of a number of the Soule patent raw-hide lined dust guards.

The Knitted Mattress Co., of Canton Junction, Mass., has on exhibition a full line of knitted cushions for car seats and other furniture, also stair pads, table padding, etc. The car seat pads are in one piece to place directly under the seat covering. This exhibit is located in the pavilion.

The Davis Car Shade Co. has on exhibition several window shades, arranged in a wooden framework representing the side of a car. This shows the shades as they are in actual service.

The exhibit of the Hamlin Car Step Co. consists of a full-sized model of their patent drop car step and a model of a car, showing the arrangement of the mechanism for operating the step. The dropping of the four steps of the car is accompanied by throwing a single lever on the platform. An arrangement is provided locking the steps in place automatically after they have been raised or dropped.

The National Car Wheel Co., of Buffalo, N. Y., show four of their full-size steel tired engine truck and car wheels, with radial sections cut out, so as to show their construction. These wheels include two spoke-center wheels and two double plate-center wheels, with internal ribs.

The Sams Automatic Car Coupler Co., of Denver, Col., exhibit their automatic link and pin coupler. About 3,000 of these couplers are in use on various Western roads.

The Lone Star Automatic Car Coupler Co., Houston, Tex., exhibits a coupler for which they are now filling two orders, aggregating 750 couplers. This coupler weighs complete 220 lbs., the knuckle weighing about 36 lbs. There are five pieces, including the drawbar and pivot pin. In connection with this coupler is shown the Roosevelt-Wheless draft box, made by the same company.

Wm. Yerdon, of Fort Plain, N. Y., exhibits his improved double hose band and adjuster, perfected can opener, etc., covering various sizes and types.

The Buckeye Malleable Iron & Coupler Co., of Columbus, O. exhibits two of their Little Giant couplers, one of which has been through a drop test. They also show samples of their malleable cast iron. A number of framed blue prints show parts in detail of their freight, passenger and tender equipment.

The Smillie Coupler and Manufacturing Co., of Newark, N. J., exhibits two couplers and separate parts showing details of construction.

Jas. McGee, of Houston, Tex., exhibits his patent improvement in foundation brakes by means of a small model. This device is a beamless brake, substituting horizontal and vertical levers for the usual brake beams.

On the southwest corner of the pavilion the A. French Spring Company, of Pittsburgh, Pa., have their exhibit of elliptic and plate springs. Together with this exhibit is that of the Morris Box Lid Company, of Pittsburgh, Pa., including pressed steel journal box lids and spring seats.

The Day Patents Company, of Syracuse, N. Y., have their automatic time register on exhibition inside the pavilion.

The Massachusetts Mohair Plush Company, of Boston, Mass., have their exhibit of mohair plushes for car upholstery also in the pavilion.

The Hale & Kilburn Manufacturing Co. at Philadelphia, Pa., have in their exhibition rattan and plush covered car seats, and sections showing the construction of the same.

The Brussels' Tapestry Co., of Chauncey, N. Y., show their self adjustable curtain fixtures.

L. C. Chase & Co., of Boston, Mass., have their plain and frieze or figured plushes for car seats and upholstering.

Pratt & Letchworth Cast Steel and Malleable Iron Works, of Buffalo, N. Y., have on exhibition the Universal freight car, brake, slack adjuster and the O. K. adjuster for passenger cars. These have been described in the *Railroad Gazette*.

The B. E. Tilden Company, of Chicago, Ill., exhibit their railway replacing frogs on the porch of the pavilion.

The M. E. Kanaly Company, of Cambridgeport, Mass., have their standard steel car door hangers, with steel track and axle for baggage and freight cars and warehouses. In this exhibit is also shown their gravity seal lock for car doors.

The Ross Valve Company at Troy, N. Y., have numerous reducing and regulating valves for steam, water and air artistically mounted above one of their water engines for blowing church organs.

The Bayer pneumatic hammer, in two sizes, is exhibited by the Chicago Pneumatic Tool Company of Chicago, Ill. Connections have been made so the actual operation of the hammer for chipping castings and beating boiler tubes or flues can be shown. In the shops of the New York, Lake Erie and Western Railway 100 boiler tubes have been beaten in one hour with this hammer. The smaller one strikes, 5,700 blows a minute, and the larger 2,200 blows.

The Schlienberg Safety Car Wheel Company of Detroit, Mich., have a pair of their safety car wheels mounted on an axle. These wheels have steel tires with retaining rings welded in by electricity.

Magnesia lagging for insulation of steam pipes, boilers, etc., is exhibited by Keasbey & Mattison Company, of Ambler, Pa. The method of attaching this lagging is shown by large model of a boiler, which is insulated with this.

The New York Car Coupler Company exhibit two of their couplers mounted on carriages running on a track to show their operation.

A full-size working model of his patented pneumatic track sanding apparatus for locomotives is exhibited by Mr. Henry L. Leach, of Boston, Mass.

The Ohio Injector Company, of Wadsworth, O., exhibit one of their Ohio injectors cut away so as to show the construction of it. This was fully illustrated in the *Railroad Gazette* of June 7, 1895.

A working model of his improved drop door for hopper bottom gondolas and grain cars is shown by Mr. Jas. E. Simons, Ass. M. C. B. of the Pittsburgh & Lake Erie Railroad, McKee's Rocks, Pa.

Inside the pavilion the Q. & C. company of Chicago, Ill., have the McKee brake slack adjuster, which was fully described in the *Railroad Gazette* April 26, 1895, and the device patented by Mr. J. W. Williams, General Foreman of the Minneapolis shops of the Minneapolis & St. Louis Railroad, for taking up the slack in the valve gear while setting the valves of locomotives. This was described in the *Railroad Gazette* three or four years ago.

On the east porch of the pavilion C. B. Hutchins & Sons of Detroit, Mich., exhibit their patent freight car roof, applied both to an ordinary double car roof and to the Morris tapered carline sheathing. The Kelsea card holder for freight cars is also shown.

Another exhibit on the east porch is that of the New York Belting & Packing Co. of New York City. This contains rubber mats and step treads, bicycle tires, steam, air-brake, cotton and linen hose, rubber tubing, rubber diaphrams, sheet packing, rubber car springs, gaskets and belting.

Besides this is the Taylor Iron & Steel Company of High Bridge, N. J., showing sections of welded and interlocked steel tired car wheels in which the joint between the cast-iron center and steel tire is clearly shown.

The tent contains, in addition to the exhibits already mentioned, the Hampson flexible steam joint. This joint has been fully described in the *Railroad Gazette*. It has no ground joints, and the connection is entirely metal. This exhibit consists of wooden construction representing the car platforms, with the connection made.

The Butler Draw Bar Attachment Co., of Cleveland, O., has an exhibit in the tent, consisting of full size models of their draw bar attachment, and full size sections of pairs of center sills.

The A. O. Norton Co., makers of the Norton sure drop track jack, has a full line of track and other jacks, ranging in capacity from 8 to 75 tons capacity, and in size from 7 in. to 36 in. This exhibit includes a compound rack and gear car jack, lately put on the market.

At the meeting of the Railroad Supplymen's Association the election of officers resulted as follows: Mr. T. R. Freeman, National Car Coupler Company, Chairman; Mr. F. A. Bartey, Hampson Flexible Joint Company, Secretary; Mr. S. G. Scarritt, Scarritt Furniture Company, Treasurer. The Chairmen of the different committees are: Mr. A. P. Perry, Dayton Malleable Iron Company, Committee on Flowers; Mr. E. C. Bates, Crosby Steam Gage and Valve Company, Committee on Entertainments; Mr. Jas. Maycock, Committee on Transportation; Mr. Willard A. Smith, National Malleable Casting Company, Memorial Committee; Mr. R. C. Fraser, *Railroad Gazette*, Committee on Printing.

Separation of Grades on the N. Y., N. H. & H. R. R. in Boston.

The work of elevating the tracks of the New York, New Haven & Hartford Railroad, in Boston, on the Providence division, is well begun, and is being carried on as fast as circumstances will allow. The most serious obstacle has been the difficulty in obtaining property, and in getting the existing buildings removed. This part of the work is now almost completed.

The line of the New Haven road from Boston out to and beyond Forest Hills station runs through a thickly settled suburban district necessitating a large number of crossings at grade, and, to facilitate traffic and prevent crossing accidents, the railroad company has decided to elevate its tracks.

The work begins at West Chester Park, near Cumberland street. The general plan is to raise the tracks about 20 ft. above present grade, on a fill between heavy retaining walls in part, and sloped and turfed where there is room. Street crossings are to be made by plate girder bridges, steel or iron arch bridges and stone arches, according to the nature of the crossing. All these bridges will have solid floors. The elevated structure will carry four tracks, and, for a short distance, that is, out as far as the roundhouse at the Roxbury shops, five tracks. The temporary tracks are to be carried in part on trestles and in part on grade, outside of the present tracks. The railroad is greatly hampered in carrying on the work by want of room.

The work further comprises the building of new stations at all stops between Chickering station and Forest Hills, including the latter. Heretofore the road has been so operated that incoming trains ran on the left hand tracks. This will be reversed, so that all incoming and outgoing stations will of necessity change places.

Among other interesting problems, the present course of Stony Brook will have to be somewhat changed, in order that necessary walls, abutments, etc., may be built. The entire work will cost about $3,500,000, of which the railroad will pay 55 per cent., the city and county bearing the remainder of the expense.

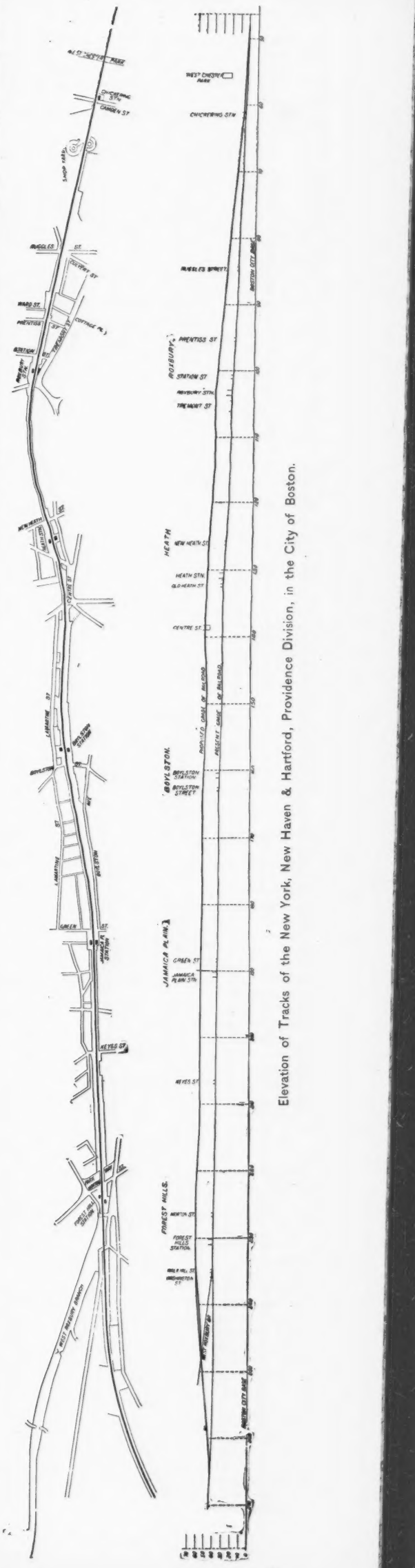
The entire work is about 4½ miles long, and extends from Cumberland street, near West Chester Park, to a point about 1 mile beyond Forest Hills station. At Cumberland street, the new grade begins, and is 21.12 ft. per mile. At this point there will be an inward and outward suburban track, between these an inward and outward express track, and in addition a side track. Chickering station will be left unchanged, since the grade does not rise sufficiently to necessitate raising it. About 1,300 ft. from Cumberland street, the grade changes to 35.9 ft. per mile. The first street crossing is at Ruggles street. This street is 80 ft. wide. There will be a clear head-room of 13 ft. under the bridge, which will be a plate girder. From here the ascending grade toward Providence is .68 per cent.

An interesting problem will be met with at Ruggles street. There are two stone culverts, about 8 ft. span each, running side by side along Ruggles street, directly over which one of the abutments for the bridge would have to be built. This not being practicable, new culverts will be built and the course of the water diverted to allow room for the abutment foundation. Not only will these two new culverts have to be built under the present grade of the road, but at the same time traffic in the street and over the railroad tracks must not be interrupted, and the free flow of water and sewage in the culvert must not be stopped.

The next street encountered is Prentiss street. This street is 40 ft. wide, and it will be crossed by a plate girder, giving a clear head room of 13 ft. The grade here is still .68 per cent. The retaining walls on both sides of the track begin at a point near the old roundhouse, at the Roxbury shop. This roundhouse will no longer be used, as it is partly in the line of the new track. A new one will be built to replace it. From here on there are but four tracks. The retaining wall is used here, since to acquire land for shops would have been too expensive, owing to its proximity to Boston. These retaining walls average about 20 ft. in height and are about 12 ft. thick at the base. Their inner face is stepped, and a 3-ft. coping, 15 in. deep, is provided. Where the line of the tracks comes nearly over the wall the latter will be made heavier than in other cases.

The next street after passing Prentiss street is Station street. This has a width of 40 ft. and is crossed by a plate girder, similar in construction to the one at Prentiss street. The first steel or iron arch is across Tremont street, which is 67 ft. wide. This arch will have a headroom of 15.5 ft. at the center and 6.5 ft. at the sides, and 15 ft. clear headroom for a width of 20 ft. in the center and will be built on a curve. Alongside of Tremont street is a driveway 40 ft. wide. The bridge over this driveway is also on a curve; and will be a plate girder.

The .68 per cent. grade terminates at Tremont street, and the line ascends from here on a .4 per cent. grade. There is, however, a short bit of level track at the point



Elevation of Tracks of the New York, New Haven & Hartford, Providence Division, in the City of Boston.

of change. The .4 per cent. grade continues to a point between new and old Heath streets, where it changes to .25 per cent. At New Heath street, 50 ft. wide, a plate girder bridge will be built, giving 14 ft. headroom. Old Heath street, which is also 50 ft. wide, will be crossed by a plate girder bridge, having iron columns placed near the curb-line of the sidewalk. This bridge is built partially upon a curve.

At the next street, Center street, the grade of the embankment is practically level, with a curve to the right, going in the direction of Providence. A bridge similar to that at Old Heath street will be built here. At this point the grade descends at the rate of .4 per cent. to a point near Mozart street. Here there is a short level space, and then the grade again ascends .4 per cent. toward Providence. Mozart street is 40 ft. wide, and is to be crossed by a plate girder, giving 14 ft. headroom built on a curve to the left. At Boylston street, a similar bridge, of 42 ft. span, will be built.

From this point the grade is again level for a short distance, and then changes to a .2 per cent. until Green street is reached. Here the Jamaica Plain station is located. At William street the grade is level, the street being crossed by a plate girder of 40 ft. span and 13 ft. headroom. A similar bridge, 41 ft. span, will be built at Keyes street. Beyond Keyes street, the grade is—.4%, and then level at Morton street. Here there are to be built five stone arches, crossing the Franklin Park driveway and Morton street. The arches over the driveway will be built by the railroad, but the city will pay the excess of cost over the retaining wall construction, which their arches will make necessary. The railroad will build the fifth arch, that over Morton street, to harmonize in appearance with the construction decided upon by the city. Morton street has a width of 40 ft., and the arch will give a headroom of 16 ft. The driveway arches will be designed to give place for a driveway, a bridle path and footways. Just beyond the Morton street arch the new Forest Hills station will be built, and this, together with the arches, will make a very handsome piece of work. The next bridge after that at Morton street occurs at Walk Hill street, which is 50 ft. wide. This bridge will be a steel or iron arch, giving 16 ft. headroom at the center, and 7 ft. at the sides. The grade here is .10 per cent.

At Washington street, which has a width of 60 ft., a plate girder bridge will be built, having iron columns near the curb-l nes of the sidewalk. This bridge is on a skew, with a .10 per cent. grade. It allows 15 ft. headroom.

This is the last street crossing, and from here the grade will descend 30 ft. to the mile, until the present grade is resumed, about a mile beyond Forest Hills. From Forest Hills also the three tracks of the West Roxbury branch are lead off to the southwest until they reach the old grade about 2,000 ft. away.

The retaining walls continue from the Roxbury shop to Ruggles street, on both sides of the fill. At points beyond this there are sections where the wall is used on both sides, on one only, or not at all. Along Lamartine street, on the west side of the line between Boylston and Heath streets, there will be built a new freight yard, at about the level of the new grade. This is possible on account of the elevation of Lamartine street. This yard will be about 1,500 ft. long.

On the east side of the track, at this point, Stony Brook has been moved eastward 35 ft., and lowered 13 ft. This was done to avoid building a retaining wall near the tracks, it being desirable to slope the embankment at this point. The slope of the embankment will cover the new course of the brook. Work is now being done upon this new culvert, and it is partially completed. It is a sewer brick culvert, 17 ft. wide and 15 ft. 6 in. high, built upon concrete. Near the junction of the West Roxbury branch the stream has also been diverted from its course, and in part the old culvert has been retained. This old culvert is of rough stone. It is now being pointed up on the inside, after which it will be grouted outside and then covered with concrete.

All the stations after passing Chickering will be built new, on both sides of the track, and connected by brick subways where necessary. Thus there will be two at Roxbury, two at Heath, two at Boylston, two at Jamaica Plain and two at Forest Hills. The foundations and one story of the existing stations at Boylston and Roxbury will be retained for the new stations at those points.

To prevent interruption of traffic on the road, while the work is being done, three temporary tracks will be laid on the east side of the present tracks, out to the Jamaica Plains station and temporary stations will be built at necessary points. The retaining wall will be built on the opposite side of the line. Two high-level tracks will also be laid on trestle work, out to and just beyond Jamaica Plain. The three temporary low-level racks then cross to the west side, and the two high-level tc : ne east side, the two crossing at a 6-deg. reverse curve each. This has necessitated an interesting construction at this point. Trestle bents of 12 × 12 in. timber and 3 × 10 in. braces, are spaced 5 ft., c. to c., at right angles to the line of low-level tracks. The high-level tracks cross this on a skew, the stringers being laid in the direction of its line. To have placed the be..ts at right angles to the line they carry would not have been possible, since the distance c. to c. would have been far too great. A similar crossing is made at the junction of the West Roxbury branch with the main line near Forest Hills.

Along the line of trestle out from Boston the track will ultimately be used for permanent way. Filling will be made around the trestle bents, as much of the construction as possible, however, being first removed. Filling will be done by removing alternate ties and dumping between.

The electric line crossing the present tracks on Center street bridge will ultimately have to be carried under the tracks at that point. While work is going on upon the bridge this line will be deflected and cross at another street. When the retaining wall opposite to the temporary tracks has been built that upon the opposite side will be begun, where, that is, there is to be such wall.

The railroad company will pay all expenses of changing and renewing sewers. The city will probably lower the grade of the south end of the Stony Brook culvert to correspond with the level to which the section near Boylston street has been lowered. Until this is done a sand catcher will be used at Boylston to prevent the new low-level section from filling up.

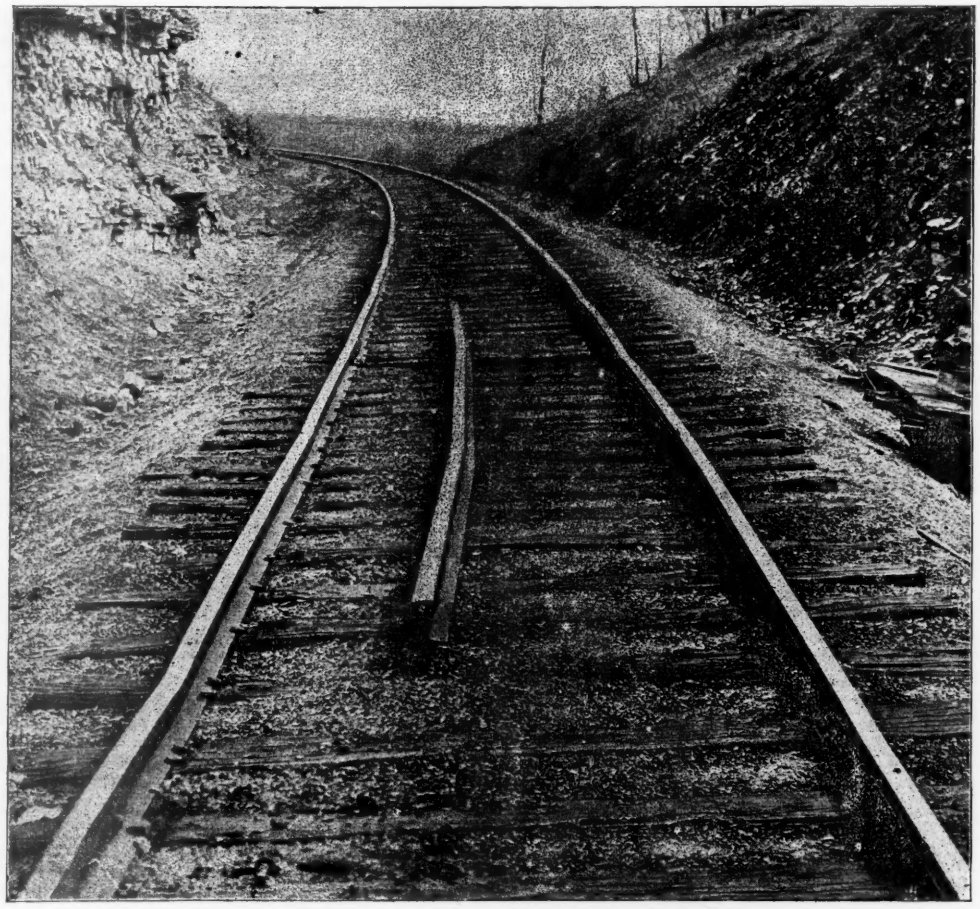
The permits to excavate and to build trestles, abutments, and do all other necessary work at the various points, out to Walk Hill street, have been secured and this work has been begun. In several cases the cross-streets must be closed in order that they may be excavated to lower grade at the crossings.

The work is under the charge of Mr. C. M. Ingersoll, Jr. To the courtesy of Mr. Curtis, Chief Engineer of the New York, New Haven & Hartford, and of Mr. Ingersoll, Assistant Engineer of Construction, we are indebted for the information used in preparing this article.

An Example of the Effect of Wrong Counterbalance.

The illustration shows a piece of track that was damaged by a consolidation locomotive that had too little counterbalance in the main driver. Several miles of rails were badly bent. The rails were bent both downward and inward. This illustration shows the need of watching carefully the speed at which locomotives are run when the counterbalances have not be examined, or when the rods have been removed. In this case the locomotives ha" been running for about eight years without damaging the tracks, so far as could be noticed; but, on the occasion of the damage, the engineer was in a hurry to make up time lost and, in pushing to make a meeting point, the engine was run (without a train) at a speed higher than the counterbalancing was adapted for, and the result was bent rails as shown. This is the sort of damage that "dead" engines will cause when hauled too fast over the road. It is not an uncommon phenomenon and those railroads that have had such experience have insisted that the orders limiting the speed of dead engines shall be strictly followed.

Several roads have been engaged in the last six months in an examination of the counterbalancing on the different locomotives and the results on three lines have been surprising to the mechanical department. In several cases locomotives have been found to be in such condition as to be dangerous to the track when run at a speed of 50 miles an hour. This is more particularly true of locomotives with small drivers.



Effects of Bad Balance and High Speed.

Railroad Legislation in Texas.

The Legislature of Texas, recently adjourned, passed a number of laws affecting railroads. Perhaps the most important is Senate Bill No. 101, which aims to compel railroads to assume joint liability on through freight. Section 1 provides:

That all common carriers over whose transportation lines, or parts thereof, any freight, baggage or other property received by either of such carriers for through shipment or transportation by such carriers between points in this state on a contract for through carriage recognized, acquiesced in or acted upon by such carriers shall, in this state with respect to the undertaking and manner of such transportation, be considered and construed to be connecting lines, and be deemed and held to be the agents of each other, each the agent of the others, and all the others the agents of each, and shall be deemed and held to be under a contract with each other and with the shipper, owner and consignee of such property for the safe and speedy through transportation thereof, from point of shipment to destination, and such contract as to the shipper, owner or consignee of such property shall be deemed and held to be the contract of each of such common carriers; and in any of the courts of this state any through bill of lading, way bill, receipt, check or other instrument issued by either of such carriers, or other proof showing that either of them has received such freight, baggage or other property for such through shipment or transportation shall constitute prima facie evidence of the subsistence of the relations, duties and liabilities of such carriers as herein defined and prescribed, notwithstanding any stipulations or attempted stipulations to the contrary by such carriers, or either of them.

Section 2 provides that any person sustaining damage to or loss of freight or baggage may sue either of the roads interested, and such road shall be held liable; but it shall be entitled in a proper action to recover from the carrier at fault, together with costs of suit.

S. B. No. 34 extends the time in which railroads may begin the construction of new lines. Any corporation chartered since Jan. 1, 1887, may begin work at any time within two years from January, 1895. Any such company which shall have forfeited its corporate existence by delay may be revived by this act, but no corporation thus revived shall exercise any right or franchise not enjoyed by other railroad corporations under the present laws. Section 2 provides that extensions of existing lines which have lost rights by delay may nevertheless be built, provided that 10 miles shall be built within one year and 20 miles yearly thereafter until the line is completed.

S. B. No. 138, approved April 6, validates the titles of certain lands which were granted to railroads for side tracks and were afterwards sold.

S. B. No. 41 repeals the law of 1879, requiring railroads to file annual reports with the Controller of Public Accounts.

S. B. No. 269 makes it a misdemeanor to board a passenger, freight or other train except for the purpose of becoming in good faith a passenger thereon. Penalty $5 to $[illegible]0.

S. B. No. 106 authorizes the incorporation of union depot companies. Railroad companies are authorized to subscribe for the stock or bonds of such companies.

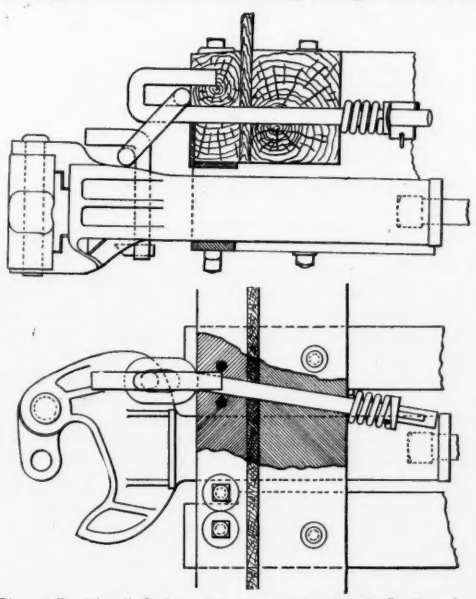
S. B. No. 35 authorizes the La Porte, Houston & Northern to buy, and consolidate with itself, the North Galveston, Houston & Kansas City Railroad Co., and the Houston Belt & Magnolia Park Railway Co. The transaction must be approved by three-fourth of the common stock of each company; the name of the new company shall be the Galveston, La Porte & Houston.

House bill No. 682 authorizes the railroad lines of the Texas Transportation Co., to be sold to any railroad company owning a line in the city of Houston.

Most of the foregoing bills became laws without the approval of the Governor, and most of them were passed under a suspension of the constitutional requirement of three separate readings.

A Safety Attachment for M. C. B. Couplers.

The troubles arising from M. C. B. couplers pulling out or from the heads breaking off have long been familiar, and many devices have been tried for getting rid of the difficulty. The one shown with this has lately been patented and has been subjected to pretty severe tests. The purpose of the designer was to provide an attachment which would keep couplers or coupler heads from falling on the track and would also provide a connection for hauling in the train when couplers are broken. The arrangement is perfectly obvious from the illustration. A hooked bolt passes through the buffer block and end sill, going in obliquely, as shown in the plan, and has a coiled spring back of the sill to take the jerk. The front end of the hook is inserted 2 in. in the wood of the buffer block to keep it from bending or turning, and the hook is made long enough to allow the



The "Positive" Safety Attachment for M. C. B. Couplers

link to slide forward in pulling, so as to bring no strain on the attachment until the emergency comes.

In case the draft rigging gives way the attachment comes into operation, keeping the coupler in place and the train coupled. Should the coupler head be broken off it will drop down and hang by the hook until it is removed, when, if a spare link and hook are carried on the locomotive, the train can be coupled up. The draw head bolt is made square at its lower end to prevent turning, and its hooked end is long enough to allow the link to slide forward until the buffer stop strikes the the car. It can be applied by drilling or casting holes on the knuckle side, in the middle of the head, or in the guard arm.

A test of this device was made at Middletown, on the N. Y., O. & W, Ry., in which wooden followers were used on the car to which this attachment was applied. Fourteen loaded, 30-ton, coal cars, with two cars braked, were placed behind the test car, and five loaded 30-ton coal cars in front of it. The locomotive backed up the train until it had attained considerable speed, when it was suddenly reversed. The wooden followers broke, throwing the strain entirely on the attachment, which held the coupler in place, the train remaining coupled, although the train was slacked up and started again, and it could have been hauled to Weehawken without any further attention.

Further information, with cost of application, can be obtained by communicating with Mr. H. C. Blye, 145 Liberty street, New York.

Car Heating.

At the May meeting of the Western Railway Club the subject of car heating was taken up, and was opened by a paper by Mr. McMynn, of the Robert W. Hunt Co. Mr. McMynn said that the question had been raised, if the vacuum return system is especially suited for long runs of horizontal piping, why could it not be applied to train heating? The subject divides itself into the heads: (1) Possibility of heating by steam; (2) Automatic regulation; (3) Economy; (4) Ventilation.

The possibilities of steam heating have been fully proved. Automatic regulation on cars has not met with the success that has been reached in buildings, but it has been successful in some instances. Of economy little can be said, for there is none. A volume could be written on the lack of this attribute. Live steam is taken from the locomotive, and as soon as it has given up a part of its heat it is thrown away.

Mr. McMynn quotes figures from the *Railroad Gazette* of March 22 last to the effect that at 10 degrees above zero about 15 lbs. pressure is necessary to circulate steam through a train, and the consumption of steam is about one pound per minute per car, or say two pounds per car mile. While these data are drawn more particularly from elevated railroad experience, Mr. McMynn finds that one pound of water per car minute would about cover the cost. With fuel at $4.50 per ton the cost of live steam heat is given at 3¾ cents per car mile, or for eight cars 30 cents per train hour, or $4.20 for the trip from Chicago to St. Paul; or with daily trips with eight trains, $12,264 for the year; being interest on $204,400. With the old fashioned car stove, burning hard coal, the cost of fuel for this trip would be $5.04, and the extra attendance and repairs would amount to as nearly as much more, besides only half heating the car.

Coming back now to the original point, viz., heating the train by exhaust steam, it was suggested that the exhaust from the lighting engine of the Paul road could be utilized by means of a vacuum pump placed in the front end of the train and exhausting into the heating system. Since writing the above I have found that Mr. T. N. Ely, General Superintendent of Motive Power of the Pennsylvania road, made very exhaustive tests of this principle during the winters of 1887 and 1888, and the results are given in a paper published by him in the *Journal of the Franklin Institute.* An account of the trials made was published in the *Railroad Gazette* of March 22, 1889. Although it may seem that I am suggesting an old subject for discussion, yet the disease of to-day seems to warrant at least some attention, and, if the saving claimed can be made, the method surely deserves a trial on some of our trains.

DISCUSSION.

MR. A. M. WAITT (L. S. & M. S): Some six years ago when I connected myself with the Lake Shore road, I found the steam-heated cars equipped with a system of direct steam-heating, in connection with which system there was an automatic trap used. We had constant trouble with the traps from wasting, or else, on account of their being so adjusted that the water would accumulate and freeze, so that when we would go into a terminal station, where the temperature was quite different from that where the car started out at the other end of the road, we would find the traps frozen up, and the car had to be set out at one side and torches or live steam used to thaw it out. The traps would frequently freeze up on the road. Later we equipped quite a large number of cars, some 100 or more, and did away with the trips. We have used some of those—at least 50 of them—through three winters, and 100 through two winters, this last winter being a very severe one. This experience, during which we have had, I might say, an entire absence in the coaches of any trouble from freezing—in fact from any trouble at all with circulation—has demonstrated to me very clearly the wisdom of doing away with the traps on our cars.

With regard to the regulation: we all find a great deal of trouble in cars that are heated by direct steam on account of being roasted in mild weather, and once in a while, rarely, finding the cars cold in intensely cold weather; but the latter is the exception. It does seem, from some experience I have had during the last three years, as though it were not absolutely necessary, with direct steam in coaches, to have intensely hot cars in mild weather. I think it is possible, and a very simple thing if undertaken in the right spirit by the officers in charge of the operation of the train, to maintain such discipline among the trainmen as to have them properly regulate the steam-heat. Of course, you have got to assist them by giving them proper means for regulation. Now, we have used in our cars very successfully a steam admission valve, which is adapted to help the trainmen in bringing about that end. Ordinarily in our cars we used a common globe valve, a valve that after it had been used a few times would, from its being so distorted by the unequal expansion, leak enough steam to make the car uncomfortable in mild weather. We have substituted for that valve a specially designed valve, by which an almost infinitesimal admission of steam can be obtained, and without any fine adjustment. The valve is also so constructed that, even with that small amount of steam coming in, there is no danger at all of cutting out the seat, because the disk of the valve, when a small amount of steam or large amount of steam is going through, is quite a way off from the seat, and the graduation is obtained by an independent means, although connected and controlled by the steam. By using such a valve a trainman can open the valve by turning it one or two turns, admit steam, and if the weather is cool, allow it to blow through the pipes until it comes out of the drip. Our instructions to our trainmen are: in freezing weather always have steam enough going into your car and out of the drip, so that by touching the drip valve you will find it hot. Don't let it be so hot that when you touch it it will burn your finger, and you will have to draw it away quickly; but so that it is moderately hot, and then you know water is passing out of the drip and no live steam. It is a very simple matter to control. Our trainmen have no difficulty; and, last winter, with few exceptions, we found there was very little excessive loss of steam from the drip, and on the other hand there was very little excessive heating in the coaches by trainmen even in moderate weather.

MR. WM. FORSYTH (C., B. & Q. R. R.): In introducing this subject before the club in 1887, I predicted that continuous steam heating would soon be as familiar a term and as general in its use as continuous brakes, and I am rather surprised, after this period of eight years, that continuous steam heating has *not* become more general. But considering the discomforts which are experienced in some steam heated cars, the matter is not surprising.

Referring to Mr. McMynn's suggestion as to the value of the vacuum system, I may say that the greatest discomfort that I ever experienced in connection with steam heating was in cars heated in that way. The Pullman cars at the rear of the train were entirely cold, and the smoking car and first coach were overheated. I do not know what the difficulty is with that system, but on other journeys on the same line, in riding in the parlor car, I have found it overheated. After eight or ten years' experiment with continuous steam heating, I should say that it was not yet a success, and in saying so I do not want to throw any discredit on the representatives of the steam heating companies, because I believe that mechanically they have done almost as much as they could, and that they have presented to us something which is perhaps nearly good enough. But, as Mr. Waitt has suggested, I think that the worst offenders are the superintendents of our railroad companies, or those who have charge of the conductors or brakemen and those who regulate the steam heat. At the last Master Car Builders' convention, we presented a careful report on car ventilation and showed up the practice that exists on all first-class roads and in first-class cars, but I do not believe the conditions are any better now, or that the report has done any good.

S. P. BUSH (Pennsylvania Railroad): We, on the southwest system, have tried to some extent the system which has been in operation on the Pennsylvania Railroad proper. That system was originally called the vacuum or return system. With this system two lines of pipe are used, one a supply pipe at one end of the cars; the other a return pipe placed on the other side. These pipes are interchangeable as either supply or return pipes, depending upon the direction in which the cars happen to be running. Connections are made from the center of these pipes with the radiating or heating pipes in the interior of the cars. The connection between cars consists of a "U" shaped hose placed horizontally so as to avoid a pocket. The supply of steam and exit of condensed steam and water are controlled by suitable valves. A vacuum pump is placed on the tank of the locomotive, and the steam used in operating the vacuum pump when exhausted is passed into the supply pipe, which is sufficient to properly heat trains in the case of moderate temperatures; at lower temperatures, live steam is also admitted to the supply pipe.

The object of this system is to properly heat cars with as low a pressure in the radiating pipes as possible, and at ordinary temperatures very little, if any, pressure is necessary in the radiating pipes. In very cold weather somewhat more pressure is necessary.

As in the case of all systems of steam heating, the greatest difficulty we have is in obtaining careful manipulation. One of the difficulties that has been experienced in maintaining the proper temperature in all the cars of a train, has been that too much steam is oftentimes admitted to the first two or three cars, more than is necessary to maintain the proper temperature, and in addition to the water of condensation that passes into the return pipe, some steam also passes with it, which destroys the vacuum and prevents a proper circulation in the rear cars.

It has been suggested that cars may be heated properly and at the same time have a vacuum in the radiating pipes. This might be done were it not for the fact that the heating surface which it is possible to apply to cars is necessarily limited, and at low temperatures this limited heating surface will not condense all of the steam that it is necessary to use in order to properly warm the cars. The vacuum system is used in buildings, but the conditions are different, and a sufficient radiating surface can be provided which will condense all of the steam admitted, and conduct the heat to the atmosphere.

The return system can successfully heat trains of even twelve cars in zero weather, if it is properly manipulated. One of the greatest difficulties, however, that we have experienced is in obtaining careful manipulation.

Two things that have a very important bearing on the matter of car heating are the arrangement of pipes and ventilation, and it would seem that the ventilating and steam heat problems must be considered together. It is a well-known fact that if the atmospheres of a car or room is ordinarily pure, it is comfortable at a much lower temperature than a car or room having impure atmosphere. It seems most desirable to provide a positive circulation of air in cars, and to compel the fresh air to first pass over the heating surface, thence into the body of the car; and to provide enough fresh air to maintain a comparatively pure atmosphere. The Pennsylvania Railroad is making some experiments in this direction, but it cannot be stated at this time exactly what can be done.

MR. E. W. GRIEVES (Baltimore & Ohio Railroad): During the last session of the Maryland Legislature a law was passed forcing all railroads running through the State of Maryland to use steam heat, and the Baltimore & Ohio were compelled by this law, during this last year

to steam heat all their equipment, and we found that the problems in regard to steam heat were numerous. We have about 100 cars equipped with water circulation with one or two different systems. The remainder of our equipment is direct steam.

The Pullman Company issued instructions, at our request, some time since, that the porter should only be responsible for the valve on the inside of the car, admitting steam to the car, the trainmen and our car inspectors being responsible for the trap or valve underneath the car, as the case might be; and we found that we had better results from this way of handling the matter. We had quite an experience with traps, and while we are still using them, we find there is some difficulty in regard to them. But our experience this last winter has been rather favorable, considering the severe season.

MR. J. W. MARDEN (Fitchburg Railroad): The matter of steam heating has got past the experimental stage with us, and we hardly need pay any attention to it; it takes care of itself. We use direct steam, known as the Consolidated Car Heating Company's system, in which we pass the steam from the engine directly to the rear of the train, and then into each car by a globe valve. We use no traps, but use a globe valve to allow the condensation to pass off. We have no freezing of pipes, and I do not know that we have had a report from our passengers during the past winter as to excess of heating or cold. I do not know that we would want to change even for anything better, at present.

MR. A. E. MANCHESTER (C., M. & St. P. R. R.): I am of the opinion that steam heating is here to stay. I believe that its range is greater than almost any other system that we can use. On our system we have to prepare our cars to keep them warm in such climates as Northern Michigan and Northern Minnesota, and also to have them equally comfortable for service in Missouri, and we are able to do this with direct steam heat, where the heat is properly handled. We have experienced a great deal of the same difficulty that was stated by Mr. Waitt with the automatic trap. We are now going out of the automatic business, and are depending upon the drip. We find that having the controlling valves for the admission of steam into the car and the escape of the drip both inside the car where they can be reached and handled at any time, it is more possible to keep the car in good condition so far as warmth is concerned, and to prevent them from being frozen up in extreme cold weather. We have that same difficulty that Mr. Waitt had with reference to the proper attention to the heat of the car, but I do not think that the system of heating is in any wise responsible for this. The great problem in steam heat to-day is to educate the men to the handling of the steam heat, instead of finding new devices.

In the course of the discussion Mr. James F. McElroy, of the Consolidated Car Heating Co., was called on. Instead of a general discussion he read a very elaborate paper detailing the methods and results of some experiments made by him in the testing room of the Consolidated Car Heating Co., at Albany, relating particularly to the phenomena of water circulation in car heating apparatus. The paper is too long for republication and too important for hasty condensation, and, therefore, we shall omit it for the present, publishing only the conclusions, which are as follows:

First, that the theory of water circulation based on different densities of water at different temperatures does not account for the circulation of water in that class of heating apparatus in which the heater is placed on a higher level than the radiating pipes.

Second, that the temperature of the water in the Baker heater coil, when circulation is taking place, is always up to 212 deg. Fahr. when atmospheric pressure is carried on the system.

Third, a circulation of the Baker heater through the radiating pipes in a car never takes place unless steam bubbles are formed in the coil of the Baker heater.

Fourth, in ordinary cases the action of the Baker heater is periodic, giving an intermittent flow of water through the pipes. In a few cases, and then continuing for a short time, the action is found to be continuous. At such times steam is formed within the coil in bubbles and passes up a short distance in the riser, but is condensed before reaching the expansion drum.

Fifth, the greatest action and the freest circulation is obtained with the Baker heater when such conditions exist which permit the formation of the greatest quantity of steam bubbles within the riser.

Sixth, the pressure within the Baker heater system tends to prevent the formation of steam bubbles and hence retards or prevents the circulation of water through the radiating pipes. This pressure causes the radiating pipes to cool down, but raises the temperature of the water within the coil and expansion drum.

Seventh, any drum system of heating, when applied to a hot water circulating system, operates under similar conditions exactly as the Baker heater.

Eighth, steam bubbles must form within the coil of pipes of any drum system to cause a circulation.

Ninth, steam pressure admitted to the drum from the train pipe, must be equal to or greater than the pressure carried within the Baker heater system, otherwise it will be impossible to generate steam bubbles within the pipes in the drum.

Tenth, it is important that expansion drums of sufficient capacity should be used, having space for expansion in upper half of drum equal to about one-tenth of the capacity of the heating apparatus to the middle line of expansion drum.

Eleventh, in applying an expansion drum, the safety valve or other connection into the top of the expansion drum should never be located directly over the riser pipe, because the eruption taking place in the coil sends a column of water and steam into the expansion drum, and strikes with considerable force the top of the expansion drum immediately above riser. This in some cases would make it dangerous, or at least inconvenient, in removing the safety valve for the purpose of allowing the escape of air from the drum.

Twelfth, all heaters should be provided with a pet cock for the purpose of letting off air and steam so that the expansion drum may be closed without danger to the person operating it.

RULES FOR FILLING BAKER HEATER.

After the Baker heater system is filled with water the fire should be started, and complete circulation obtained, and air boiled out of the water as much as possible with the safety vent open to allow the escape of air. Water in expansion drum should be tested, and enough added to fill about one inch above the center of expansion drum when pipes are all hot and the water fully expanded. The fire should then be urged to a point where free steam forms and discharges at the opening on top of the expansion drum. After it has discharged for a sufficient length of time, to make sure that the air is all out of the water, the expansion drum can then be closed. This operation should be performed every time air is admitted to the expansion drum, or every time an examination is made as to the condition of the water.

If care is taken in carrying out the above directions the Baker heater system will not require water one-third as often because of the decreased pressure upon the pipes, and hence decreased loss of water through leaky joints, and second, a very much freer circulation will be maintained at all times and less trouble from the "air binding of the apparatus" will be experienced.

In speaking of this paper Mr. Barr said that it seems to him to stand above anything that has been presented to the club for the past five years as a specimen of close, scientific investigation carried out on lines that are bound to give results. He felt that the club could be proud of having this paper in its proceedings.

MR. C. H. PETERSON (Safety Car Heating and Lighting Co.) presented a few facts received within a few days from a prominent railroad in the Northwest. These showed that the time consumed in completing the circulation in a standard sleeping car with 552 lineal ft. of radiating pipe was 11 minutes. To raise the temperature from +10° to +70° took 1 h. 45 min. In a standard 52-ft. coach the time to complete the circulation was 8 minutes. In the coldest weather with temperature —42° the steam pressure on the train pipe in an 8-car train was 40 lbs., and that was sufficient to maintain an even temperature throughout the train. The estimated cost of maintenance was 30 per cent. less than with car stoves and Baker heaters. The estimated saving in labor on account of cleaning smoke and ashes from the inside of the car was 50 per cent.

MR. GIBBS mentioned the importance of good rubber hose for steam heating. He has been trying to keep a record of the life of hose, his service being especially severe; where the electric light engine is run, 100 lbs. steam pressure has sometimes to be carried back. There it is found that one-fourth of the hose in use between engine and tender and tender and first cars lasts 30 days; that is, when the engine hauls the train using electric lights possibly twice a week. At other times when the pressure is less the average life of hose is 45 days. In trains using steam pressure of only 20 to 50 lbs. the engine hose lasts about four months. Back in the train where pressure is less the life is about one season. These results are only got with the very best hose in the market, and the St. Paul road has found the highest priced hose to be the best and most economical. They have taken special pains to increase the life by making very solid fastenings from the hose to the shank. Where this fastening is not solid the life is much less. The hose costs between $3 and $4 apiece.

The Champion Steam-Joint Grinder.

We illustrate herewith a machine for grinding steam-pipe joints, especially those on locomotives. It is the invention of Mr. Frederick Brandes, of Rondout, N. Y., and is now in use on the Delaware & Hudson and the Ulster & Delaware railroads, where it has given very satisfactory results.

Fig. 1 is a side elevation of the machine, and Fig. 2 is a horizontal sectional view. Fig. 3 is a detailed sectional view showing the construction of the steam-pipe joint in connection with which this machine is especially adapted to be used. It may be used, however, for grinding all pipe joints having registering concave and convex or beveled surfaces. The joint illustrated in Fig. 3 is especially designed to admit of unequal expansion and contraction, and of a slight rocking motion of the pipe, without leaking. To secure this it is necessary that the convex surface of the ring should be ground into the concave seat of the pipe. This operation has heretofore been performed entirely by hand.

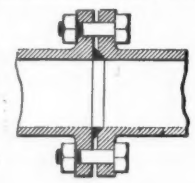


Fig. 3.

The frame of the machine comprises the opposite parallel bolt rods *B* and the end bearing bar *D*, the opposite extremities of which bar are adjustably secured to one of the threaded ends of the bolt rods. As will be seen from the engraving an adjustment is provided for clamping the frame of the machine directly to the flange of the pipe upon which it is to be operated. The end frame bar *D* connecting the two bolt rods carries a central bearing collar in which turns a bearing bushing *E*. This bushing is provided with an eccentric bearing opening *H* in which turns the outer end of the sectional grinding shaft *K*. This shaft consists of two separate sections *M* and *N*, having a loose connection between its two sections at *O*. A geared wheel is provided with a crank by which it is rotated, and the gearing is such that the shaft section *N* will be rotated at a faster speed than the section *M*. The shafts are kept pressed tightly against the work by the spring *P*. In operating the machine it is only necessary to rotate the wheel *R* to impart a rotary motion to the jointed shaft sections, and as has been said, the shaft section toward the pipe will revolve at a greater speed than the other. This makes the rotary motion imparted to the joint ring *C* greater *X*, relatively to the oscillating or rocking motion imparted by the bearing bushing, than would be the case did both sections of

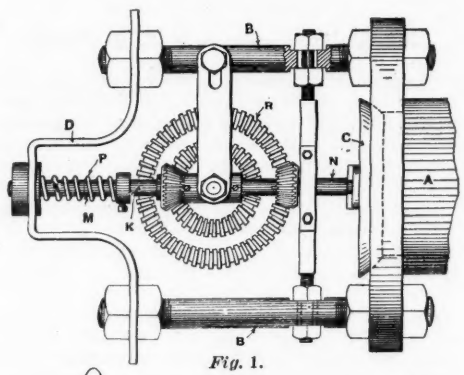


Fig. 1.

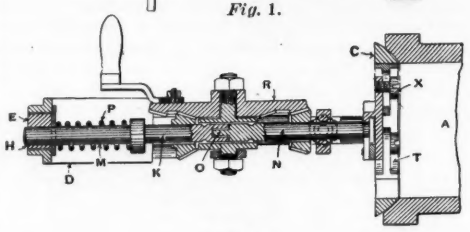


Fig. 2.

Champion Steam-Joint Grinder.

the shaft revolve with the same rapidity. By this means the joint is more rapidly ground than would be possible were both motions imparted to the joint ring at a uniform speed.

The chuck or holder *T* is provided with a series of radial sectional chuck arms provided at their outer ends with curved plates fitting against the inner sides of the ring *C*. They are held in place by means of the adjusting screw *X*. To begin work, it is only necessary to secure the ring *C*, in the chuck, and after centering it on the pipe into which it is to be ground, revolve the wheel *R*.

By means of this machine the work can not only be done in much less time than was possible by the old method of grinding by hand, but the work is more regular and exact. The eccentric ring *E* may be changed to a central bored ring when grinding flat joints. There is, then, of course, no oscillating motion.

English Block Signal Rules.

In March last the principal railroads in England and Scotland adopted uniform regulations for signaling trains by the block telegraph system, the new code being the work of a committee of officers of different roads which had had the subject under discussion for several months. As a matter of interest to American railroad men who operate the manual block system we reprint this code in full, as issued by the London & Northwestern. In substance the rules are not materially different from those long used on all the roads,* and the new code is an improvement chiefly in the full and precise language, and the uniform arrangement. We note, however, that the English railroad superintendent is not different from his cousin on this side of the Atlantic, in wishing to have things precisely according to his own views of what is right, and the block-signal code of another large company, which we have since received, contains many little additional clauses not shown in the L. & N. W. issue, besides having some of the matter (which is not included in the numbered paragraphs) differently arranged. We are assured, however, that the code which we now print is in exactly the shape approved by the committee, with the exception of Rule 24, which was intentionally left blank for each company to fill in according to its own ideas.

To the many American railroad officers whose creed begins and ends with "brevity" this code will appear excessively wordy—tediously so, in fact. While not disputing the correctness of this view, we are frank to say that this characteristic of the English code is one of the things that led us to reprint it, and that we think American rules are often as much too short as the English are too long.

*We note, however, that *Herapath's Journal*, in a recent editorial notice of the adoption of the new code, states that the very serious collision at Thirsk in November, 1892, would not have occurred if the signalmen had at that time been working according to the regulation now incorporated in Rule 3—that *A* must not offer a train to *B* before the preceding one has been signaled back from *B* as out of section. The Board of Trade inspecting officer called attention at the time to the fact that this rule was to be found in the codes of most other railroads.

LONDON & NORTHWESTERN RAILWAY.

REGULATIONS FOR TRAIN SIGNALING BY BLOCK TELEGRAPH SYSTEM.

..... *Signal Box.* .....*Station.*

BELL SIGNALS.

See regulation.		Beats on Bell.	How to be given.
1	Call attention	1	1.
4	Be ready (or "is line clear?") for express passenger train, or breakdown van train going to clear the line, or light engine going to assist disabled train	4	4 consecutively.
	Be ready (or "is line clear?") for ordinary passenger train or breakdown van train not going to clear the line	4	3 pause 1.
	Be ready (or "is line clear?") for branch passenger train	4	1 pause 3.
	Be ready (or "is line clear?") for fish, meat, fruit, horse, cattle, or perishable train composed of coaching stock	5	5 consecutively.
	Be ready (or "is line clear?") for empty coaching stock train	5	2 pause 2 pause 1.
	Be ready (or "is line clear?") for fish, meat or fruit train composed of goods stock, or express cattle or express goods train	5	1 pause 4.
	Be ready (or "is line clear?") for ordinary goods or mineral train stopping at intermediate stations	3	3 consecutively.
	Be ready (or "is line clear?") for branch goods train	3	1 pause 2.
	Be ready (or "is line clear?") for through goods, mineral, or ballast train	5	1 pause 1.
	Be ready (or "is line clear?") for light engine or light engines coupled together, or engine and brake	5	2 pause 3.
	Be ready (or "is line clear?") for ballast train requiring to stop in section or platelayers' lorry requiring to pass through tunnel	5	1 pause 2 pause 2.
..	Train entering section	2	2 consecutively.
6	Bank engine in rear of train	4	2 pause 2.
10	Train out of section, or obstruction removed	3	2 pause 1.
12	Obstruction danger	6	6 consecutively.
13	Blocking back	6	Inside home signal—2 pause 4. Outside home signal—3 pause 3.
17	Stop and examine train	7	7 consecutively.
18	Canceling "be ready" (or is line clear?") or "Train entering section" signal	8	3 pause 5.
19	Train passed without tail lamp.	9	9 consecutively to box in advance. 1 pause 5 to box in rear.
20	Train divided	10	5 pause 5.
21	Shunt train for following train to pass	11	1 pause 5 pause 5.
22	Vehicles running away on wrong line	12	2 pause 5 pause 5
5	Section clear but station or junction blocked	13	3 pause 5 pause 5.
23	Vehicles running away on right line	14	4 pause 5 pause 5.
24	Opening of signal box	15	5 pause 5 pause 5.
27	Testing block indicator and bells	16	16 consecutively.
24	Closing of signal box	17	7 pause 5 pause 5.
28	Time signal	18	8 pause 5 pause 5.
29	Lampman or fog signalman required	19	9 pause 5 pause 5.
30	Testing controlled or slotted signals	20	5 pause 5 pause 5 pause 5.

Block System.—The object of the System of Block Telegraph Signaling is to prevent more than one train being in the section between two block signal boxes on the same line at the same time.

The signaling of trains on the Block Telegraph System does not in any way dispense with the use of fixed, hand or fog signals, whenever and wherever such signals may be requisite to protect obstructions on the line.

The signal boxes at which the block telegraph working is in operation, are furnished with instruments to signal for each line of rails, and the system under which these instruments are to be worked, and the mode of indicating the description of approaching trains, is laid down in the following code of regulations.

Normal Position of Fixed Signals.—The danger signal must be kept exhibited at all the fixed signals, except when it is necessary to lower or turn them off for a train to pass; and, before any signal is lowered or turned off, care must be taken to ascertain that the line is clear, and that the block telegraph and other regulations have been duly complied with.

Normal Position of Block Indicators.—When the block instruments are not in use the line must be considered blocked: the indicators having *three* positions being vertical or neutral, and those having *two* positions showing "train on line" or other authorized blocked position.

Use of Block Instruments and Bells.—These must be used exclusively for the purposes shown in the block telegraph regulations, and must not, under any circumstances, be used for conversing. They must only be used by the signalman or other person specially appointed for the duty.

The movements on the block instruments and bells must be made slowly and distinctly, and the pauses between the sets of beats clearly marked.

1. *Call Attention.*—Except where special instructions are issued to the contrary, *the "call attention" signal must always be given before any other signal, and must be acknowledged immediately on receipt.*

2. *Repetition and Acknowledgment of Signals.*—Except where special instructions are issued to the contrary, no signal must be considered as understood until it has been correctly repeated to the signal box from which it was received. When the "be ready" or ("is line clear?") signals are not acknowledged, they must be given again at short intervals.

3. *Mode of Signaling by Block Telegraph.*—*A*, *B*, and *C* represent three consecutive block signal boxes, and the process of signaling a train is as follows:

Prior to the despatch of a train from *A*, the signalman there, provided he has received the "train out of section" signal for the previous train, must call the attention of *B*, and, having obtained it, must give the proper "be ready" (or "is line clear?") signal; if the line be clear at *B* the signalman there must acknowledge the signal and place the block indicator to the "line clear" position.

The signalman at *A* may then, if the line be clear, take off his signals for the train to leave *A*.

On the train leaving *A* the signalman there must send the "train entering section" signal to *B*, and the signalman at *B* must acknowledge the signal and place the block indicator to "train on line," or other authorized block position.

B must then, provided he has received the "train out of section" signal for the previous train, call the attention of *C*, and, having obtained it, must give the proper "be ready" (or "is line clear?") signal to *C*. On receiving permission from *C* for the train to approach, *B* may take off his signals for the train to proceed to *C*, and, as soon as the train has arrived at, or passed B, or been shunted clear of the main line at *B*, the signalman must call the attention of *A*, and, having obtained it, give the "train out of section" signal to *A*.

Where the sections are short, the "be ready" (or "is line clear?") signal must be sent forward where necessary to avoid delay to the train, as soon as it has been acknowledged and before the "train entering section" signal has been received. *Instructions on this point are laid down where necessary at the foot of these regulations.*

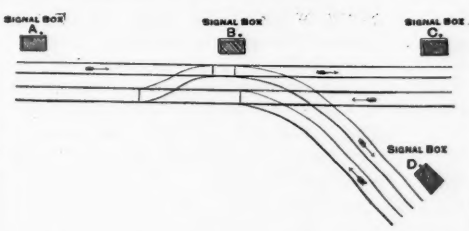
4. *Line Clear or Giving Permission for a Train to Approach.*—Unless special instructions are given to the contrary the line must not be considered clear, nor must a train be allowed to approach from the signal box in the rear, in accordance with Rule 3, until the preceding train has passed at least a quarter of a mile beyond the home signal, nor until all the points over which the approaching train has to pass have been placed in their proper position, and the line is clear for at least a quarter of a mile ahead of the home signal.

Where the signal box in advance is less than a quarter of a mile ahead, permission for a train to approach must not be given to the signal box in the rear until the "train out of section" signal has been received from the signal box in advance.

After permission has been given for a train to approach in accordance with Rule 3, no obstruction of the line on which such train requires to run must be allowed until the train has been brought to a stand at the home signal, or has passed into the section in advance, or the "canceling" signal has been received from the signal box in the rear.

If the line be not clear, or if from any other cause the signalman be not in a position to give permission for the train to approach when the signalman in the rear forwards the "be ready" (or "is line clear?") signal, that signal must not be acknowledged until the signalman to whom the signal has been sent is prepared to receive the train, when he must give permission for it to approach in accordance with the described regulations.

At junctions, except where otherwise provided, the approach of trains, which can cross or foul each other, is regulated as shown below:



When permission has been given by *B* for a train to approach from *C* no train must be allowed to leave *D* until that from *C* has been brought to a stand at the home signal, or has passed through the junction for a distance of a quarter of a mile, or until the "train out of section" signal for the previous train has been received from the next signal box ahead if within that distance; nor in such a case must a train be allowed to leave *A* for *D* unless the junction facing points at *B* are set for *C*, and the line towards *C* is clear for a distance of a quarter of a mile beyond the junction points, or until the "train out of section" signal for the previous train has been received from the next signal box ahead if within that distance.

When permission has been given by *B* for a train to approach from *D*, no train must be allowed to leave *C* until that from *D* has been brought to a stand at the home signal, or has passed through the junction for a distance of a quarter of a mile, or until the "train out of section" signal for the previous train has been received from the next signal box ahead if within that distance.

When permission has been given by *B* for a train to approach from *A* for *D*, no train must be allowed to leave *C* until that from *A* has been brought to a stand at the home signal, or has passed clear of the junction, or the junction facing points have been set for *C*, and the line toward *C* is clear for a distance of a quarter of a mile beyond the junction points, or until the "train out of section" signal for the previous train has been received from the next signal box ahead if within that distance.

When a train has been sent to the starting signal and the rear of the train is well clear of the junction, permission for a following train to approach may by given by the signalman to the signal box in the rear if the points are set for the following train to pass on to another line, and that line is clear.

5. *Section Clear but Station or Junction Blocked.*—(*This signal must only be used where it is specially authorized by a note at the foot of these regulations.*) When the line is clear to the home signal, and it is necessary for a train to be allowed to approach cautiously in consequence of an obstruction existing ahead of the home signal, or from any other cause, the "be ready" (or "is line clear?") signal must not be acknowledged, in accordance with Rule 3, but the "section clear but station or junction blocked" signal must be given, and when this signal has been acknowledged, the block indicator must be placed to the "line clear" position. The signalman receiving the signal must (if the train has not already passed the home signal toward the starting or advanced starting signal) bring the train to a "dead stand" at the home signal, and verbally instruct the driver that the section is clear, but the station or junction ahead is blocked. A green flag by day and a green light by night must at the same time be exhibited to the driver, and the necessary fixed signals lowered to give permission for the train to proceed. The "train entering section" signal must then be given and acknowledged, and the block indicator placed at the "train on line" or other authorized blocked position.

Where the home signal is at such a distance from the signal box that it is not possible for the signalman to communicate verbally with the driver when the engine is standing at the home signal, the signalman must, after bringing the train to a *dead stand* at the home signal, lower it to allow the driver to draw up to his signal box, and must stop the train at the signal box by exhibiting a red flag by day and a red light by night. The driver must then be verbally instructed that the section is clear, but the station or junction ahead is blocked; after which a green flag by day and a green light by night must be exhibited to the driver and the necessary fixed signals lowered to give permission for the train to proceed.

If a train is assisted by an engine in the rear, a green flag by day and a green light by night must also be exhibited to the driver of the engine in the rear of the train.

Except where special instructions are issued to the contrary, when a train has passed the signal box and is brought to a stand at the starting signal or the advanced starting signal, the driver must understand that the lowering of the starting signal or the advanced starting signal is an indication that the line is only clear to the home signal at the signal box in advance, and that he must regulate the speed of his train in the same way as if he had been verbally instructed to proceed under the "section clear but station or junction blocked" signal.

When some time is likely to elapse before the train for which the "be ready" (or "is line clear?") signal has been sent will be ready to enter the section, the "section clear but station or junction blocked" signal must not be acknowledged; but when the train is ready to enter the section, and before it is allowed to do so, the "be ready" (or "is line clear?") signal must be again sent, in order to give the signalman at the box in advance an opportunity of receiving the train under Rule 3, if the circumstances are so altered as to admit of his doing so.

6. *Bank Engine in Rear of Train.*—After the "train entering section" signal has been given to the signal box in advance, and the indicator has been placed to the "train on line" position for a train that is assisted by an engine in the rear, the "bank engine in rear of train" signal must be given to the signal box in advance, to indicate that an engine is assisting the train in the rear. The "bank engine in rear of train" signal must be acknowledged by being repeated, and a note of the signal must at once be made in the train register book at the signal box in advance, and the "train out of section" signal must not be given until the assisting engine has arrived.

NOTE.—*This regulation only applies at places where the use of bank engines is specially authorized.*

[TO BE CONTINUED.]

Canadian Railroad Report.

The annual report of the Department of Railways and Canals of the Dominion of Canada for the year ending June 30, 1894, has just been issued. It is a thick volume and costs 40 cents. The report of the Minister of Railways, Hon. John Haggart, as well as that of the Chief Engineer, Mr. Collingwood Schreiber, contain information down to several months after the close of the year. There are good maps showing all the railroads and canals, with voluminous notes of extensions under construction or proposed. The statistical tables are very full.

The principal information in the report is summarized as follows:

Miles of railroad completed (track laid)	15,768
Miles of sidings	2,017
Miles of iron rails on main line	400
Miles of steel rails on main line	15,368
Miles of steel rails (double track)	526
Capital paid (including the four following items)	$887,913,088
Government bonuses paid	$156,716 638
Government loans paid	$21,569,149
Government subscriptions to shares paid	$300,000
Municipal aid paid	$14,153,611
Miles in operation	15,627
Earnings	$49,552,528
Working Expenses	$35,218 433
Net earnings	$14,334,095
Passengers carried	$14,462,398
Train mileage	43,670,029
Passengers killed	12
Grain elevators	50
Guarded level road crossings	135
Unguarded level road crossings	9,869
Overhead bridges	406
Level crossings of other railroads	212
Junctions of other railroads	313
Junctions of branch lines	215
Engines owned	1,965
Engines hired	87
Sleepers and parlor cars owned	154
Sleepers and parlor cars hired	45
First-class cars owned	961
First-class cars hired	31
Second-class and immigrant cars owned	68 5
Second-class and immigrant cars hired	5
Baggage, mail and express cars owned	626
Baggage, mail and express cars hired	10
Cattle and box cars owned	32,758
Cattle and box cars hired	3,094
Platform cars owned	14,589
Platform cars hired	315
Coal and dump cars owned	4,685
Coal and dump cars hired	14

The total amount of subsidies promised to railroads completed and under construction up to June 30, 1894, is $203,166,983. Of the 12 passengers killed only two suffered in train accidents. The table showing all fatal casualties shows 12 passengers, 67 employees and 132 other persons, a total of 211.

The Cumberland Car Shops.

The Baltimore & Ohio has recently begun the actual work for the erection of extensive shops at Cumberland, Md. The plans have been under consideration for considerably over a year, and the plans now adopted provide for the building of the most extensive repair and construction shops of its whole line. The plans contemplate a series of buildings and sheds covering nearly 15 acres of ground, a portion of which will be erected this year. Ground has been broken already for the roundhouse, 305 ft. in diameter, to contain stalls for 44 locomotives.

Adjoining the roundhouse the company is also erecting this year a repair shop 225 ft. by 60 ft. This is intended for minor repairs on locomotives, and the building besides will contain storerooms for oil and waste. Yards also are to be laid out between the main line of the road and the shops when they are completed. They will be divided into six sections, and will have a capacity of nearly 3,000 cars, with the necessary switches and signal towers, and a steel coal trestle 600 ft. in length will be provided for coaling the locomotives and supplying the shops.

The repair and construction plant proper is to be built next year. It will include a machine shop 100 ft by 300 ft., and a blacksmith shop annexed 80 ft. by 100 ft., and beyond this a boiler shop and storehouse are to be added.

The erecting shop in this series of buildings will be 140 ft. × 450 ft., with room for 44 locomotives at one time, space also being reserved for a second shop to be at some future time. When built this will be 140 ft × 250 ft., with a capacity for 36 locomotives at the same time. Beyond the locomotive shops is a large structure 180 ft. × 350 ft. for building and repairing freight cars, in which 68 cars can be worked on at one time. Further on two shops are provided for, each 150 ft. × 450 ft., where passenger coaches and sleeping cars will be constructed.

In addition to these buildings the plans as prepared call for five transfer sheds, each 50 ft. × 450 ft. In connection with these, a two-story office and storehouse 45 ft. × 250 ft. is also contemplated. A sawmill 70 ft. × 250 ft., and a foundry 80 ft. × 200 ft., for making iron and brass castings, complete the plant.

All these shops are to be of brick with iron roofs, the architectural work within being also of iron. The General Manager of the Baltimore & Ohio Company, R. B. Campbell, has devoted much time to the equipment of these shops. Power cranes and the most improved machinery will be put in. It is claimed that the shops will be up to the very best standard of railway shops. When the plant is completed three or four years hence, it is proposed to build most of the rolling stock of the Baltimore & Ohio system at Cumberland, as well as to do repairs for the lines east of the Ohio River. Other shops along the line will be used merely for repairs on the local divisions.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Eastbound freight situation at Chicago is still very unsettled, and the uncertainties have continued so long that rate cutting is definitely reported, as will be seen by our Chicago letter; although it is said that the increase in shipments last week consists mainly of freight, which roads ahead in the "pool" had requested shippers to hold back until June 1, the time when the penalty clause became ineffective. Mr. Ingalls is the chief figure in the traffic world this week, as he was a week ago. Then he encouraged a hope of harmony by authorizing his Eastern road to join its competiters in an association; now he is accused of producing discord by ordering his Western road to withdraw from the eastbound agreement on a technicality, the plea being that the money clause of the agreement expired June 1. It appears that the clause was thus written, though everyone understood and expected that each road was bound by the money clause, as by the rest of the agreement, until after a 30 days' notice of withdrawal. But whatever Mr. Ingalls' reasons may have been for backing out of the agreement, there is little question that the fact that much freight, competitive as regards the Chicago roads, goes east through gateways south of that city and is not subject to the agreement, must have continued to be a constant source of much irritation. St. Louis papers report the situation there as very bad, rates being so irregular that shippers, even, complain of the inconvenience. The freight rate situation west of Chicago is also in a critical condition, but the roads there, as well as the Central Traffic roads, are to make an attempt to patch up matters to-morrow (June 15). Demoralization being in the air, it has extended to New Orleans, where freight rates to Texas on the principal heavy commodities have been reduced to 20 and 15 cents, being in some cases 75 per cent. below regular rates. The reductions from St. Louis to Texas are the cause of this.

A committee reported to the Southern and Southwestern Railway Club at the April meeting on the cause of the uneven wear of driving wheel tires. This committee reached the following conclusion which relate not to the *causes* of the uneven wear, but to the means of reducing it:

"First, the weight of reciprocating parts and the consequent overbalancing of the driving wheels, should be as light as possible.

"Second, the smallest proportion of reciprocating parts is to be balanced, that is found consistent with smooth operating machinery and easy riding conditions.

"Third, the influence of a competent and careful engineer operating the throttle.

"Your committee is not sufficiently prepared to offer any valuable suggestions that would very materially prevent uneven tire wear under the existing disadvantages."

While the language of these conclusions is somewhat mixed, they contain the gist of the matter; although the cart is put before the horse. In this particular case the most important factor is the engineer and the least important is the balancing. However careful an engineer may be, the wear will be somewhat uneven, but that it can be reduced so as to be an unimportant factor in locomotive repairs is proved by the fact that some well balanced locomotives are run with pretty nearly uniform wear and such cases are not exceptional where the trains are light and the engineers are careful, even when the speed is high. There is considerable evidence that most of the uneven wear comes from the handling of the engine. We have examined a great many diagrams from driving-wheel tires, and so far have failed to find that the counterbalancing affects the uneven wear materially. The slipping of the tires by a careless engineer in starting causes most of the unevenness; and where the engineer is careful and the train is light and easily started, the wear comes mainly from the rolling of the tire on the track, and is nearly uniform. The theory of "imperceptible slip" is pretty nearly destroyed, and a number of tests made somewhat recently show that the distance passed over by a locomotive is very nearly equal to the circumference of the driver multiplied by the number of revolutions. In the average they are the same, but sometimes one or the other happens to be greater to the extent of a few feet. The committee appointed by the Master Mechanics association to report on the wear of driving-wheel tires will present some interesting information this year based upon some extensive calculations made by Mr. E. M. Herr, Assistant Superintendent of Motive Power, Chicago & Northwestern Railway. These calculations will probably show whether or not there is any reason to suspect that the counterbalancing materially affects the unevenness of the wearing of the tire. This subject has been pretty well investigated before by Mr. Barr and Mr. Herr before the Western Railway Club (*Railroad Gazette*, June 17, 1892, p. 447; also June 22, 1894, p. 441.)

The committee appointed last year by the Master Mechanics' Association to continue its investigations of exhaust nozzles and steam passages will not report this year. They have not had the time, money and opportunity to make the investigations that are necessary to settle this perplexing question. It is one question that affects and should interest all important railroads in this country, for it is generally admitted that the theory of the design of exhaust apparatus is still undeveloped, and that the cut and try plan is the only one that can be relied on now. Each road has its own design of apparatus, which answers more or less well the practical requirements of that particular road, but whether it is better or inferior to the apparatus used on other roads is not known. It would save time and money if a joint appropriation could be made to have the necessary experiments carried on. It is hardly fair, in a generally useful investigation, to ask one railroad to meet the expense of collecting information for other roads. The Master Mechanics' Association is a joint institution, and its proceedings are distributed for the benefit of all its members, and when a question arises that requires the light of experiments it is just that the expense of these experiments should be borne by those who are to be benefited by them. A small sum of money used for expenses only will go a long way toward getting results where there are no salaries to be paid, and in this case the cost to each road would be very little. These remarks apply as well to the committee appointed to make shop tests of locomotives, as that committee will be unable to make a report this year that will be anything more than a plan for procedure. They have had no money and no authority; therefore, could not go on. The total cost of the proposed tests would be very small, and when dis ributed over the different roads on the proposed basis of a pro-rata sum for each locomotive in operation, would disappear in the comparison with the financial saving that would result from accurate information about steam use in locomotives. It is not of much use to appoint committees with instructions to make investigations without at the same time giving them the necessary powers and opportunities for doing so. The result is always disappointing, not only to the committees who are unable to make a creditable report, but more so to the members of the Association who read over the list of committees and expect in the reports to get useful information. One way out of this is to consider what a committee can possibly do before appointing it; and if an appropriation is needed there should be enthusiasm enough among the officers of the Association to get it, and not throw upon the committee the double labor of searching out the opportunity for experiments and then thinking out the plan and drawing conclusions from the results. Officers are elected because of their experience and standing, and it is part of their duty to stir up enough interest to improve the Association during their time of service. No important move can be made by the exhaust nozzle or shop-tests committees without an appropriation, and an appropriation can only be had when the officers of the Association have that amount of enthusiasm and appreciation of the work which will prompt them to act in their official capacity and expound to railroad offices the value of the work they have asked their committees to do.

The use of green lights, in fixed signals, to indicate all-clear at night, where red lights are used to indicate danger, is approved by the Committee of the American Railway Association as "good signal practice." As the members of this committee hold opposing views on nearly every question which it is possible to disagree about, this statement, which appears in their last report and which seems to have been unanimous and voluntary, indicates that one of the two most definite objections to the use of green for all-clear, the color-blind objection, is not deemed very weighty. This objection *is* weighty, if it is once admitted that color-blind men are to be permitted to run engines (or to fire), for the defect which leads one to see both red and green as gray is the most pronounced manifestation of color-blindness known to the experts. As long as the main distinction between signal lights is between white and red tolerable safety is assured by keeping the white very clear and the red very deep, thus enabling the color-blind to distinguish them by their relative lightness; but two lights, one red and the other green, may be precisely equal in the amount of light they give out. As some 10,000 enginemen now run under red and green in England, and as the Chicago & Northwestern has used red and green many years, it must be admitted that the justification of experience, which in the American Railway Association is regarded as the final seal of all that is good, is in this case very strong. It is encouraging to be able to believe that American and English railroad managers, generally, have at length either got rid of their color-blind enginemen or have resolved to do so. Some roads still tolerate rather loose methods of examination for the detection of color-blindness but the triumph of correct methods seems now to be only a question of time.

The other important objection to substituting green lights for white is the cost of altering the semaphore castings and glasses, which on one of the smaller British roads was $85,000. This, added to the inconvenience of changing the practice and the rules, tempts one to rest satisfied with the present practice, comforting himself with the argument that the existing arrangement has never caused any great disaster. Probably this obstacle to the proposed change will yield only to time, and time will not hurry. Meanwhile it will be well for every one to frankly admit that the danger which it is proposed to eliminate by abolishing white lights *is* in the future. The main point, the multiplication of house and street lights in large towns, is essentially so; but that is no reason for classing it as unimportant. Are railroads always to have the reputation of being taught safe methods only by disasters? The third objection to a change, the difficulty of getting a perfectly satisfactory distant signal, seems to be regarded by the majority of the committee as the chief objection, but we cannot believe that they will long maintain this position. It can be attacked on all sides. The English roads get along very well with the same colors on the distant signal that they have on the home. Those who think that plan nearly right, but not quite so, can employ the French principle of putting two red lights on one signal and one on the other. This principle has long been used by the French, though they do not apply it in just the right way. The Chicago and Northwestern is satisfied to use a combination of red and green for the danger indication at the distant signal, and the experience with this arrangement on that road is not small or insignificant. The mechanical objections to it are not insurmountable. A fourth scheme, the simplest of all, is the use of amber lights on the distant signals. This is still in the theoretical stage, but no defect has been shown in the theory, or even strenuously claimed. If the amber is too deep and looks like red, the error is on the side of safety. If it is too light and looks like white, and the engineman is in doubt whether he should act on the signal, what then? Why, he must wait until he gets close enough to the post to satisfy himself that the light actually is on that post and not in some house or street lamp; but to provide for this contingency, is just what a distant signal is for. Such a signal must be *distant* enough to enable the engineman, *after he passes it*, to do what it requires, or else it does not fulfil its function, day or night.

The Locomotive and the Track.

On another page appears a letter under the caption given above, and over a distinguished signature, and there seem to be special reasons why we should write a few words in answer.

The ground taken by us, at least (and we shall not

now speak for any one else) is that the effect on the track can be reduced, by the proper designing of reciprocating parts, to a point where at reasonable speeds it is not injurious. In the *Railroad Gazette* of May 17, page 309, will be found an example of lightened reciprocating parts that may be taken as a perfectly practical plan of construction, which, while not being the lightest possible, is easily reached. These parts are for an eight-wheel, 19-in. cylinder locomotive, weighing 123,000 lbs., built by the Schenectady Locomotive Works for the Delaware & Hudson Canal Company. This locomotive will ride well if 250 lb. of weight is left unbalanced on each side. This amount has been determined from the practical working of a large number of locomotives of this weight. The weight of the piston, crosshead and part of the main rod which form the reciprocating parts, is 650 lbs. on each side. Deducting the weight that can remain unbalanced, the weight to be balanced is 400 lbs. As there are two drivers on each side, 200 lbs. of balance can be put in each wheel. If this is found to be too much, it is perfectly practicable to use six drivers for high speed, but this phase of the question can be set aside here and the condition of the four-coupled locomotive examined as being more in accord with present practice.

The locomotive for which these parts were designed has a 68-in. wheel and therefore is intended for speeds up to 70 miles an hour. Larger wheels are used for higher speeds, while the cylinders and the reciprocating parts remain the same. With a 7-ft. wheel this locomotive might be expected to run at 90 miles an hour. The crank-pin velocity at 70 miles an hour with the 68-in. wheel is 36 ft. per second. With the 84-in. wheel at 90 miles an hour it is 38 ft. per second. The centrifugal force of 200 lbs., revolving at one foot radius, at these speeds, is 8,100 lbs. for the 68-in. wheel at 70 miles an hour, and 8,900 lbs. for the 84-in. wheel at 90 miles an hour. If two drivers only were used the centrifugal forces would be about twice as much, and if six drivers were used the forces would be but two-thirds as much. If the locomotive is compounded the centrifugal force must be much higher.

Thus the disputants have a basis to work on, and the argument can proceed without waiting for further facts so far as the locomotive is concerned. It is possible to decrease the weight of the reciprocating parts still further, but not enough so as to materially affect the figures here given.

It now remains to be settled whether these forces will injure the track, and we shall hope that some of our readers who are track men will take this up. So far little of value has been published or said about the actual effect on the track of the centrifugal force of the "excess balance" when the wheel does not lift from the rail. In this specific case the weight on the rail is about 21,000 lbs. per driver, and therefore the wheels will not lift. Of course Mr. Morison is right in saying that it is impossible to counterbalance a locomotive so that there will be no vertical disturbance; but whether it is or "is not economical to build such a track" as will stand this disturbance, and whether it has or "has never yet been done," will remain open questions until facts are collected that show conclusively that locomotives balanced on the common plan and run at ordinary and reasonable speeds either do or do not injure the track more than will be allowed by general managers, who are bound "to get the best results from the whole rather than from a single department." What is most needed now is evidence on this specific question from a track standpoint; and until facts presented show that, under normal conditions, track is damaged seriously by locomotives, those who claim that the effect on the track can be enough reduced by proper designs of reciprocating parts, will have the weight of argument on their side.

Subjects Before the Master Mechanics' Convention.

The Master Mechanics' convention next week will consider reports on eleven subjects. On two of these subjects there will be no report of importance, viz., exhaust nozzles and steam passages and on shop tests of locomotives. The committee on locomotive fire kindlers was continued over from last year, and the chairman, Mr. Hickey, will give a good presentation of such devices from a practical standpoint. The proposed standard gages for sheet metal tubes and wire will probably be accepted, as the plan is a good one. (See *Railroad Gazette*, Dec 28, 1894, p. 885.) The report on the utilization of railroad scrap material will contain some further practical information relative to the results got from using scrap by modifying it and working it so as to give it the dimensions of new material without reducing it in a scrap furnace. This subject has been considered by the Western Railway Club and well discussed. (See *Railroad Gazette*, Dec. 7, 1894, p. 833.)

The two reports, causes of bulging of firebox sheets and riveted joints, will be looked for with much interest. It is understood that information will be presented by the committee and others that will show beyond a doubt that firebox sheets below the water line near the fire get redhot even when the water is above the crown sheet, the reason being that the fire is so hot as to drive the water away from the sheet. This has been disputed by so many that the proofs will be scrutinized with care as well as interest.

Riveted joints are always more or less perplexing to design when the three conditions, strength, tightness and freedom from concentration of the bending action, are to be secured. Bending action goes on continually in boiler shells unless they are perfectly cylindrical, and joints must be made so as to prevent concentration. The report on this subject will contain some useful information gathered by men who are competent to speak from practical experience about the advantages of the numerous types of riveted joints now used in boilers.

The report on the material and specifications for boiler tubes will be useful if it recommends a standard, for the reason that the wide variations in present specifications is perplexing to tube makers.

"Pistons and piston rod fastenings" is in the hands of a committee that has had considerable experience with large pistons, and types of engines on which there are peculiar strains on the piston rods, therefore the recommendations are expected to be novel and perhaps sweeping in character. Within the last two years there have been more broken piston rods than ever before in the same time, if one can judge from the numerous reports. The reason for this it is hoped the committee will expound, and this is what makes the coming report of particular interest to those who have been using certain types of crossheads, which produce a twisting strain on the piston rod, particularly the Laird type.

The wear of driving wheel tires has been well considered before this, and, to be useful, the report must contain some conclusions based on actual observation. Tire wear is so far from being uniform in its characteristics that it does not appear that there is any simple law which governs it. It would appear that the engineer, in handling the engine, and the train load, which affects the pull of the locomotive, are the two factors which mostly control the flat spots.

Probably not one of the subjects in hand could be illustrated at such length with the information obtainable as that of the transmission of power. Within the past year there has been a very marked increase in the use of electric motors and air hoists. so that much might be said that would be interesting as showing what is being done, but the possibilities of electric and pneumatic transmission of power in railroad shops are well understood, and most railroad men are only waiting for good times to proceed with such improvements on the lines already laid down.

Last year there was recommended a specification for boiler material. The specification was accepted with the understanding that it would be reconsidered from time to time, as experience dictated. The specification, as it now stands, has some defects that were pointed out in the discussion last year and in these columns Sept. 21. 1894, p. 650. It would be well if the specification could be reconsidered at the convention this year, as there are a number who approved of it last year who are now dissatisfied, and some of those who have changed their minds were members of the original committee. The committee was not continued last year, as it possibly should have been, and unless the subject is called up by some member from the floor, it will remain with the executive committee to see that it is brought forward for reconsideration, as agreed last year.

Annual Reports.

Chicago, Rock Island & Pacific.—This company makes its report for the year ending March 31, 1895. The total mileage worked was 3,571; of this 2,881 miles are owned, 353 leased and the company has trackage rights over 338. All of this mileage is used in calculating the quantities which will be found in the tables below. Of course the results as compared with last year and with the year preceding show a falling off. The passenger earnings as compared with the year ending March 31, [illegible], decreased 33.65 per cent., and the total number of passengers decreased 20.6. The passenger mileage decreased 41.36 per cent. The average distance traveled in 1894 was 57 miles, and in 1895 it was 42 miles. The rates per passenger mile, as shown in the table below rose from 1.9 cent to 2.15. In considering this matter of passenger travel and earnings we must remember that the Rock Island is peculiar in including in 1894 the World's Fair business, ina much as its year begins April 1, so what we have called 1894 includes the World's Fair summer of 1893.

The freight earnings as compared with the preceding year fell off 12.81 per cent. and the tons carried declined 11.75 per cent. The rate per ton-mile increased from 1 cent to 1.05. Here again we see what is apparent in so many reports—the decline in volume of coarse, long-distance freight, taking low rates, which accounts for the increase in the average ton-mile rate.

The net earnings from operation in the year now reported on were $4,738,555. Nearly $1,150,000 was received from premium on Minneapolis & St. Louis Railway bonds sold, and deferred interest on bonds of the same company, raising the available net income to almost six millions. After the payment of $3,300,000 interest on bonded debt, and 3 per cent. on the capital stock, and of rentals, there remains a surplus of $353,000. But for the income from the Minneapolis & St. Louis securities mentioned above there would have been available only about $583,000 for dividends on a capital stock of over 46 millions.

The table below shows the mileage worked for various years, going back as far as 1887 in order to include the years before the great extension of the Rock Island lines took effect. In the first column of the table are results for the year now under review and in the four columns which follow appear the changes as compared with four earlier years and expressed in percentages. The falling off in gross earnings, expenses and net earnings was about the same as compared with 1893 and with 1894. Of course the increase as compared with 1889 and 1887 is very great as the result of the great increase of mileage. An interesting measure of the effects of thinning out the line is given by the second table, where it will be seen that gross earnings declined from nearly $9,000 a mile to less than $5,000 and net earnings from $3,477 to $1,327, the rates remaining practically the same.

	1895.	1894.	1893.	1889.	1887.
Miles	3 571	3,571	3,610	1,538	1,384
		Changes from above years, percentages.			
Gross earnings	$17,420,817	−17.3	−16.9	+35.8	+41 4
Working expenses and taxes	12.682,761	−15.4	−15.4	+38.8	+69.1
Net earnings	$4,738,555	−20.8	−19.5	+27.7	+ 1.5
Per cent. of operating expenses and taxes	72.80	71.14	71 93	71.08	60 92

Results per Mile Worked

	1895.	1894.	1893.	1889.	1887.
Gross earnings	$4 878	$5,892	$5,960	$8,347	$8,999
Expenses and taxes	3,552	4,194	4,275	5,933	5,412
Net earnings	1.327	1,697	1,685	2,414	3,477
Ton-mile rate (cents)	1.05	1 00	1.05	0 97	1.01
Passenger-mile rate (cents)	2 15	1.90	2.11	2.21	2.33

In the operations reported the Chicago, Rock Island & Texas is not included. The President says, however, "this road has proved a very valuable addition to the system. It opens up a territory which has heretofore never furnished any business to the company, and the road, in addition to paying its operating expenses, has earned and paid interest on the entire cost of construction and served as a feeder for a large amount of business."

Of course the great falling off in freight earnings is largely attributable to the loss of grain tonnage owing to crop failures. The tonnage of corn, for instance, was 284,672 last year, 694,661 the year before, and 515,627 in 1893. Oats and wheat did not fall off as much, but the total tonnage of these three crops carried was about half last year of what it was in each of the two preceding years. In other items of freight the decline was not nearly so serious, although there was, of course, a considerable falling off.

Notwithstanding the bad year some work of improvement has been charged to operating expenses. For instance, 21,000 ft. of pile and trestle bridges have been replaced by permanent works or filled with earth at a cost of nearly $200,000, which was charged to working expenses.

Work on track elevation in Chicago was begun Aug 15, 1894. At the close of that year about $140,000 had been expended when work was stopped for the winter. It was resumed again in April, and it is contemplated to build about two miles this year. The total length of elevated track when completed will be about seven miles. Some other minor improvements have been made, as, for instance, putting in the Hall block system between Englewood and South Englewood, Ill., and at Moline and Rock Island, Ill..and an interlocking plant has been erected at the Atchison crossing at Peabody, Kan. Passenger equipment has been improved by the introduction of air signals and gas lighting fixtures. The President refrains from any comment as to prospects.

The Punctuality of Trains.

In the *Railroad Gazette* of May 24, page 333, we published some figures showing the comparative punctuality of passenger trains arriving at various large London termini and we now have the pleasure of presenting similar statistics made up at a few American cities.

The greatest percentage of trains on time, or nearly so, that appeared in the London tables was 82, which referred to the London Bridge station of the Southeastern Railway for the month of June. The best showing made by an American road is considerably better than that; but it is not to be assumed that the bare figures afford a sufficient basis for a true comparison, and we only mention these percentages for the purpose of bringing the tables to the attention of those interested, who can themselves make certain obvious allowances in estimat-

ing the degree of credit that should be accorded the several roads. For instance, the three separate stations of the Southeastern—London Bridge, Cannon street and Charing Cross—are at the ends of three very short branches, so that practically the 2,500 trains represented came in over the same line. To judge of the density of traffic these three ought to be lumped together as one station. The extent of third and fourth main tracks, different on different roads, is another feature which it is necessary to take into account, but for which data is lacking.

The Pennsylvania station at Philadelphia and the Boston & Maine station at Boston are alike in one respect; they both receive large numbers of trains, but in each case the trains come over three or more different lines, their routes converging within less than two miles of the terminal. Unfortunately, however, the statistics for the two stations have been made up on different plans, so that close comparisons cannot be made.

The fullest report that we have received from an American road is that from the Pennsylvania, which is as follows:

TABLE A; P. R. R.—TRAINS ARRIVING AT JERSEY CITY FROM PHILADELPHIA OR BEYOND, AND AT PHILADELPHIA FROM JERSEY CITY; JUNE, JULY AND AUGUST, 1894:

Month.	Total No. trains.	Percentage on time or not more than 5 mins. late.	Percentage over 3. mins. late.
June, 1894	1.890	79.5	2.8
July, 1894.....	1.910	75 9	2 9
August, 1894.....	1,946	75.2	2.8

This includes all trains from the West and South, some of which traveled nearly 1,000 miles.

TABLE B; P. R. R.—TRAINS ARRIVING AT BROAD STREET, PHILADELPHIA; JUNE JULY AND AUGUST 1894, AND APRIL, 1895:

Month.	Total No. trains.	Percentage on time or not more than 2 mins. late.	Percentage over 2 mins. late.
June, 1894	5,003	81.47	18.53
July, 1894	5.158	83.44	16.56
August, 1894 ...	6.443	81.46	18.54
Total.....	16,684	82.08	17.92
April, 1895.....	6,077	89.1	10.9

This includes all trains arriving at Broad Street station, some traveling from Jacksonville, Fla., over 900 miles; St. Louis, nearly 1,000 miles; Chicago, over 800 miles; Washington, 137.6 miles, and a large number of trains from New York, 89.6 miles.

TABLE C; P. R. R., NEW YORK DIVISION.—ARRIVALS AT PHILADELPHIA FROM JERSEY CITY. AND AT JERSEY CITY OF TRAINS ORIGINATING AT PHILADELPHIA:

Month.	Total No. trains.	Percentage on time or not more than 5 mins. late.	Percentage over 30 mins. late.
June, 1894	1,2 6	83.4	.7
July. 1894.....	1,249	80.9	.8
August, 1894.....	1,233	87.5	.6
Total.....	3,698	83.9	.7

Every train included in this statement traveled 89.6 miles.

TABLE D; P. R. R.—TRAINS ARRIVING AT BROAD STREET STATION, PHILADELPHIA, APRIL, 1895:

Total number of trains	6,077
Percentage on time or not more than 5 mins. late.....	93.1
Percentage over 30 mins. late.....	1.3

This includes all trains arriving at Broad Street station, the same as Table B.

On the Philadelphia & Reading, for the month of April, 1895, the arrivals at the termini of the New York and Bethlehem divisions were:

Total number of trains (5) miles or over)	1.482
On time or not more than 5 minutes late, per cent.....	87.8
Six to 10 minutes late.....	7.6
Ten to 20 minutes late	3.3
Twenty to 30 minutes late.....	0.5
Thirty or more minutes late.....	0.8
	100.0

The Boston & Maine sends us the following table of arrivals at Boston for the first three months of the present year. It includes all trains traveling a distance of 40 miles or more. While the first quarter of the year is not a season of heavy traffic, it is to be remembered that the lines of this road in Maine, New Hampshire and Vermont are subject to delays by snow in winter more than is the case with any of the other roads mentioned in this article.

[A, number of trains; B, percentage of trains arriving on time; C, percentage of trains arriving not more than 5 minutes late; D, percentage of trains arriving on time or not more than 5 minutes late; E, percentage of trains arriving 6 to 10 minutes late; F 10 to 20; G, 20 to 30; and H, over 30 minutes late.]

1895.	A.	B.	C.	D.	E.	F.	G.	H.
January...	1,194	67.8	17.2	85.0	5.4	5.8	1.8	2.0
February..	1,068	62.3	13.1	75.4	5.8	6.5	4.1	8 2
March.....	1,167	84.5	9.8	94.3	2 3	1.9	0.4	1.1

These figures include trains traveling from Bangor, Me., 245 miles; Montreal via White River Junction, 335 miles; Montreal via Newport, Vt., 342 miles and a large number of other trains that traveled over 100 miles.

One Boston and one Chicago road have given us brief statistics, but they are too modest to allow their names to be published, and we shall therefore have to call them the A & B and the C & D., respectively.

A. & B. R. R., 1894.

	June.	July.	August.
Number or trains (100 miles or over).....	650	704	704
On time, or not over five minutes late, per cent	79	86	87
Thirty minutes late or over, per cent	4	4	4 5
Ditto, excluding trains delayed waiting for connections, per cent.....	.017	.004	.0045

The C. & D. road sends but one item, the total number of arrivals at the terminus for the month of August, 1894, which was 1,264. The percentage of trains arriving on time was 88, and of those arriving 30 minutes late or over, 0.9. Many of these trains traveled less than 50 miles each, but some traveled 500 and 1,000 miles.

Discipline Without Suspension.

The railroads which believe that the suspension of employees for misconduct does more harm than good, and which have therefore abolished suspensions, have recevied an important accession to their ranks, the Chicago & Alton having joined them June 1. This indicates that the list, though small (Fall Brook Railway: Indianapolis division, P., C., C. & St. L.; Toledo & Ohio Central; Chicago & Alton), may increase rapidly when the change shall have been discussed a little more. In fact, we are not sure but there are some other roads already following the new plan. Certainly there are many operating officers who fully believe in it. Only one superintendent, so far as we know, has proposed the change and then backed out; and it is possible that in that case the details were not rightly adjusted or that the employees, whose desire to continue in the old way was acceded to, were not thoroughly informed as to how the change would work.

The Chicago & Alton circular, signed by General Superintendent W. E. Gray, reads as follows:

Beginning June 1, 1895, the practice of suspending employees in the transportation, machinery and telegraph departments on account of shortcomings will be discontinued. Records will be carefully kept in detail by the heads of each department, showing the service of each employee, whether good or bad. These records shall be confidential, as between the company and each individual employee; that is, any employee may be shown his individual record at any time he may desire to examine it, but he may not, under any circumstances, be shown the record of another employee.

When the individual record shall show an employee to be careless, indifferent, or incompetent, to the detriment of the company's interests, such employee will be permanently removed from the service. The removal, however, shall not take place until the record shall have been submitted to, and such action approved by, the General Superintendent. Each employee will be notified promptly of all entries made in the record book opposite his name.

All employees start out with a clear record on June 1, 1895.

In the promotion of employees, their previous record will be carefully considered. When an employee performs an especially meritorious act, it is desirable that the same shall be put upon the record.

Each subordinate officer is cautioned and urged to see that information necessary to the proper keeping of the record of each individual, is promptly forwarded to the head of his department.

It will be observed that the Superintendent does not bind himself by any rule as to the number of demerits or "days" which he will deem sufficiently large to require the discharge of an employee. In fact, there is no rule as to what value shall be attached, to a demerit in estimating the whole record of an employee for a series of months or years.

In the scheme which was not put in operation (above referred to) it was intended, we believe, to record one demerit mark where, under the former custom, one day's suspension would have been ordered; and when an employee had 100 marks against him he was to be discharged. Bulletins describing offenses were to be posted once a month. A nervous anxiety in the minds of the men concerning details may greatly affect the success of a change. The Chicago & Alton circular seems peculiarly well fitted to allay any such nervousness; but it is not always easy to correct long standing prejudices, as may be seen from the letter copied below. This letter, written at the request of the Superintendent, to whom it was addressed, was read at a recent Superintendents' meeting:

"Dear Sir:

"In regard to me giveing my opinion of the too sistems of dealing with Bad Luck It is purthy hard to tell for one is as bad as the other. In the old way when we was not doeing much a man got from 7 to 15 dayes for a verry light case. The new way does away with that. In the old way a man does a lots of little cases that the company does not notice. In the new way every thing he does gowes on the board. In the new way when a mans leef is full he is a goner. I dont care how good a man is his leef will get full sooner or latter. When a man is dismissed he asks a man for a job, he will want to know what was the mattr, you will tell him your leef is full then 9 out of 10 men will think you are no good. In the old way when a man wants to know what is the Trouble all you haf to tell him is the last case you had. I think a man has a much larger Leef in the old way than he has in the new way. Some is kicking on account of there cases Posted on the Board to the Public. I would sooner have my case Posted on the Board then to have it Posted in the Yard Masters office in —— for their is no Publicer Board in —— then the Gang that gather there to spread the news, ther the case is Cut and dried and all over town long before it gets to your office. In the old way a man has not got a full Job for if he has not got Excellent Luck he is off about ⅛ of his time. In the new way when a man gets a Job he has a full Job for he can work all of the time while he is there. The old way only gives you ⅞ of the time. So I Perfer the new way I can work all the time if I dont stay so long."

General Superintendent Brown, of the Fall Brook Railway, has just distributed the customary annual premium of $50 to each freight conductor whose record of service for the year ending May 31 was absolutely clean. Of the total number of conductors, 46, the number receiving premiums was 33.

The Superior Court for New Haven County, Connecticut, has recently decided an interesting point upon the liability of railroad companies for the carriage of baggage. The plaintiff, who was at Saratoga, desired to go to New Haven by way of the Albany Day Line boats, and, wishing to save the trouble and expense of having his baggage transported across New York City, caused the same to be checked by way of the Boston & Albany road to New Haven. He obtained checks from the hotel porter, reading over the B. & A., but he had no ticket, and did not become a passenger over that road. The train upon which the trunks were shipped was the one which went through the bridge at Chester in August, 1893, and the baggage was destroyed. Plaintiff brought suit against the B. & A. to recover for his lost baggage, alleging that the accident was caused by the gross negligence of the company. But the railroad answered that it owed no duty whatever to the plaintiff to carry his trunk safely, inasmuch as it was deceived into supposing that he was a passenger on this train and that whether it was negligent or not in permitting the accident to occur, yet so long as it did not wilfully destroy plaintiff's baggage it could not be held. To this answer plaintiff demurred, alleging that it was not sufficient to release the company from liability, but Judge Ralph Wheeler held that the answer was sufficient and that the company was under no obligation to the plaintiff other than to refrain from wilfully and maliciously destroying the baggage. The case will probably go to the Supreme Court of Errors, and will establish a precedent upon this point.

NEW PUBLICATIONS.

A Text-Book on Roofs and Bridges. Part III. Bridge Design. By Mansfield Merriman, Professor of Civil Engineering in Lehigh University, and Henry S. Jacoby, Associate Professor of Civil Engineering, Cornell University. 8vo, cloth, 425 pp., numerous cuts, and 18 folding plates. No index. New York: John Wiley & Sons, 1894. $5.

In 1888 the first part of the work of Professor Merriman and Professor Jacoby was published by Wiley, namely, "Simple Trusses." (We do not understand that Professor Jacoby helped in this.) In 1890 the second "Graphic Statics" appeared. The third part and much the largest volume appeared last autumn uuder the title of "Bridge Design." Physically it is a convenient and attractive volume with good type and good engravings. The easiest way of telling generally what it contains is to give the chapter headings. They are: I. History and Literature. II. Principles of Economic Design. III. Tables and Standards. IV. Design of a Roof Truss. V. Design of a Plate Girder Bridge. VI. Design of a Pin Bridge. VII. Design of a Riveted Bridge. VIII. Comparison of Class-Room Designs. IX. Bridge Lettings and Shop Drawings. X. Bridge Shops and Buildings. XI. Shop Practice. XII. Ballast Floor Bridge on N. Y. Central R. R. XIII. Half Through Skew Lattice Bridge on Norfolk & Western R. R. XIV. Pony Truss Lattice Bridge on Missouri, Kansas & Texas Railway. XV. Through Pin Bridge by Union Bridge Co. XVI. Through Pin Bridge by Pencoyd Bridge and Construction Co. XVII. Deck Skew Pin Bridge by Phœnix Bridge Co. XVIII. Elevated Railway Structure. XIX. Highway Bridge Construction and Erection.

We may assume that the author will set forth in his preface, in the fewest words, his aim in writing a book and that nobody can do it better; therefore, we will accept Professor Merriman's preface as the best statement that can be made of the ideas had in mind in preparing this book. The attempt was to present the subject rationally, as an application of the principles of mechanics, and practically, as an illustration of modern economic structures. Chapters I. to VIII. treat largely of the former, and IX. to XIX. of the latter, but the two ideas are everywhere blended, as they must be to secure proper strength and the greatest economy. The volume is confined to bridges resting on two supports. The study of bridge design should be largely that of proportioning details according to specifications, and simple bridges furnish these in endless variety. In this volume details are discussed directly in connection with a proposed design clearly showing the interdependence of parts. Chapters IV. to VII., inclusive, prepared by Professor Jacoby, give complete computations for the design of four typical bridges and in each case the design is based on standard specifications, every requirement being fully carried out, the entire effect of wind having been considered, resulting in somewhat heavier sections than are common in practice. Chapters IX. to XI. are on shop methods and XII. to XIX. give examples of different types of bridges recently erected by different companies.

The authors have availed themselves of the assistance of various engineers, and besides using freely the specifications of Cooper and Waddell, and the designs and advice of Morison, Thomson, Churchill, Schneider Maurice, Deans and Duerr, they have had special chapters written by different authors. For instance, the chapter on bridge lettings and office work is entirely by Mr. Ralph M. Wilcox, Instructor at Lehigh University. The one on bridge shops and buildings is by Mr. Charles M. Jarvis, President of the Berlin Iron Bridge Co.; that on shop practice is by Mr. S. T. Wagner, formerly Superintendent of Shops of the Phœnix Iron Co.; that on elevated railroad structures is by Mr. O. J. Marstrand, formerly Assistant Engineer of the Brooklyn Elevated.

The book as a whole has the characteristics with which we are familiar in Professor Merriman's work; it is simple, straightforward and logical in arrangement and statement. The scheme of the book is coherent, and the carrying out of the scheme in detail is admirably direct and concise.

The chapter on history and literature fills 16 pages. Naturally, it can only be very general as to history, but it gives a good bibliography. The chapter on the principles of economic design fills 11 pages. This is a gen-

eral statement of the principles which control in deciding on the number of piers, lengths of spans, choice of type of bridge, economic depth of truss, etc. The following general equation is given for the total cost of a bridge in which l is the distance between end abutments, x the number of spans, m the cost of the two abutments, n the cost of each pier, p the cost per lb. of superstructure, and a and b constant for one type of truss. The weight of the x spans is $x\left(a\frac{l}{x} + b\frac{l^2}{x^2}\right)$

Thus the total cost of the work is:

$$C = m + n(x-1) + p\left(a\ l + \frac{b\ l^2}{x}\right).$$

The cost of the total structure is a minimum when the first derivative of C with respect to x is zero and this gives $n = p\ b\ \frac{l^2}{x^2}$ which shows that the cost of one of the intermediate piers should equal the cost of the main and lateral trusses of one of the spans. Or $x = \sqrt{\frac{p\ b\ l^2}{n}}$ gives the economic number of spans. If l = 1,000 ft., a = 350 and b = 5 and p = 5 cents per lb.; then for n = $5,000, the most economic number of spans is $x = 7$, and the total cost is $83,000 exclusive of abutments. Here the cost of the intermediate piers is $30,000 and that of the seven spans is $53,200, which indicates that the old rule that the cost of the superstructure must equal the cost of the substructure, in order that the cost of the whole may be a minimum, may sometimes be at fault.

Chapter III., dealing with tables and standards, calls attention to various manufacturers' pocketbooks as indispensable to the student, and gives tables which are not all found in any one of these pocketbooks, with examples of their use. This chapter covers standard loads for bridges, proportions of rivets, rivet spacing in angles, pin plates and rivets, properties of channels, eyebars. standard bridge floor and expansion bearings. Under the topic of standard bridge floors is given the standard specification of the Pennsylvania Railroad for wrought iron bridges. Under expansion bearings we have the joint designed by Mr. Morison for a viaduct and used in the approach viaduct of the Bellefontaine bridge and first published in the *Railroad Gazette*. We have also the expansion bearing first used in the Memphis bridge, which was published in the *Railroad Gazette* in 1893.

The four chapters which follow take up designs of special bridges, carrying them out thoroughly and minutely. As we have said, these chapters are by Professor Jacoby.

The chapters on bridge shops and shop practice will be of special use to students and young engineers.

Chapter XI. is a description of the design of a ballast-floor plate girder bridge from data furnished by Mr. George H. Thomson, formerly Engineer of Bridges on the New York Central. It gives a general description, loads and stresses and specifications for construction and for the steel, together with general drawings. Chapter XIII. on a half-through, skew, lattice bridge, is from data furnished by Mr. Charles S. Churchill, Engineer Maintenance of Way, Norfolk & Western Railroad. This example is treated in the same way as the one in the preceding chapter, and so of each of the following individual examples, namely, a pony lattice bridge from data and drawings furnished by Mr. C. C. Schneider, Chief Engineer of the Pencoyd Co.; a through pin bridge, from data furnished by Mr. C. S. Maurice, lately of the Union Bridge Co.; another through pin bridge, from data furnished by Mr Schneider; a deck, three-truss, skew bridge from data furnished by Mr. John Sterling Deans, Chief Engineer of the Phœnix Bridge Co.; and a highway bridge for electric railway traffic, from data furnished by Mr. H. O. Duerr, Manager of the Lehigh Valley Construction Co. The collection of these actual examples is a capital idea; and they are selected to illustrate definite applications of principles, and have been really edited—not pitched into the covers of a book. Thus they will be useful to the "student and the young engineer" as a matter of course; and we suspect even more useful to the discriminating old engineer who knows how to use other men's work.

In a book so thoroughly well executed it is difficult to pick out one thing which seems to be very much better done than another, and yet we are especially struck by the chapters on design of individual examples of different types of bridges. Here the student is taken carefully through the various steps of specification, computation and design, down to the last details, and each step is taken with such pains and deliberation, and the cross references are so frequent that the object of every step is easily discerned by the student. It seems as if even an editor with this book before him could design a good bridge, and what higher tribute could be paid? We may properly add, however, that the book is a real addition to the remarkable literature of bridge engineering which has been created in this country.

History of the Rensselaer Polytechnic Institute (1824–94). By Palmer C. Ricketts. New York: John Wiley & Sons, 1895. Pages, 194, with catalogue of graduates and index. Price $3.

The story of the school established by Stephen Van Rensselaer in 1824 for the "diffusion of scientific knowledge among the people" and the "application of science to the common purposes of life," is of interest, not alone to the body of useful and distinguished men who have been educated there, but to all those who like to know about the forces which have built up the nation. It is the story of one of the early efforts in this country to promote the diffusion of scientific knowledge, an effort which culminated in the establishment here of the first school of civil, as distinguished from military engineering, to be set on foot in an English-speaking country. Here we get a glimpse of the heroic work of Amos Eaton, the philanthropy of Stephen Van Rensselaer, who for years supported a large proportion of the expenses of the school from his private income, and all the curious vicissitudes which seemed from the first to make the success of the school impossible.

A minor but important part of the book is the story of the curious development of the "Rensselaerian method," a method of instruction which put the pupil in the position of the teacher, causing him to give demonstrations and lectures which were criticised by the remainder of the class. This system has left its mark on the present system of instruction used at the Institute. In letters written in the year 1824 Stephen Van Rensselaer refers to this method of instruction as having been original with him, and denies that it resembles in any way the Fellenberg and Lancaster methods used abroad. It was undoubtedly novel in several particulars. A pamphlet issued in 1827 by Amos Eaton says: "It will appear from a perusal of this pamphlet that this school is not Fellenbergian nor Lancastrian, but is purely Rensselaerean." Stephen Van Rensselaer was too sincere a philanthropist, however, to care about the credit due him as its originator so long as the results were satisfactory.

The school began its life in a building called the Old Bank Place, Troy, N. Y., and its first Senior Professor was Amos Eaton. Some of the curious regulations of the early school would be formidable to students of the present day. One of these was the necessity of rising at sunrise and undergoing 20 minutes later an examination upon the subjects of the previous day. The afternoons were usually spent in experimental work and in the preparation of demonstrations for the coming day. Excursions were also made to various shops, factories, etc., in the vicinity of the school in order that the students might have an opportunity of inspecting practical work and work using the theories which they were studying.

It is of interest to note the struggles which this school, afterward to become the *alma mater* of a body of alumni pre-eminent in their profession, endured that the principles of its founder, carefully guarded by its first senior professor, might be preserved for its future work. Not only were the finances of the school so low that Professor Eaton undertook during one year to act as senior professor without compensation, but in 1862 almost the entire buildings, apparatus and collections of the school were destroyed by fire. During the entire time from the establishment of the school the total amount of money received from the state has been only $32,494, an amount curiously small compared with that received by other similar institutions.

Although the institute is now a school practically of civil engineering, this degree was not given at the time of its first establishment. The degrees as then granted were B. A. and M. A. In 1835 it was decided that the degree of Bachelor of Natural Science should be conferred instead of that of Bachelor of Arts, and further, the graduates in the department of mathematical arts should receive the degree of civil engineer. The first class of civil engineering was graduated in this year, 1835, four graduates receiving the degree.

Among other interesting features of the book are a number of extracts from copies of the registers and other publications issued descriptive of the school at its early stages. The ideas of what constitued a technical education in those days seem curious to us now. A list of questions covering the work of a term in the department of mathematical arts shows, however, that the work was of the most thorough nature. The present name of the school, the Rensselaer Polytechnic Institute, was not given to it until 1856. At this time Mr. B. F. Green had succeeded Mr. Eaton as Senior Professor, and to him, next to its founder and first senior professor, the school owes more than to any other man. By this time the office of Senior Professor was changed to that of Director.

Through many years of hard and often unpaid work on the part of a number of devoted men, the standard of the Institute was gradually raised until it became the best and most famous scientific school of the country. Although never rich it has been able to do its work in a sound way, and it has depended for success upon thoroughness in methods of instruction rather than upon fine buildings and great laboratories. The classes have not usually been very large and the precentage of those graduated has been small, and probably the alumni have made more mark on our industrial history than any other body of the same number of men.

Motive Powers and Their Practical Selection. By Reginald Bolton. New York: Longmans, Green & Co., 1895. 12mo, 258 pages with index. Price $2.25.

It was Mr. Bolton's purpose in compiling this book to collect into one small volume the essential elements which govern in the choice of a motive power, so far as these can be generalized. The information gathered from man's experience with machinery is so scattered as to be inaccessible to many people and much of it unknown even to those who are comparatively well informed. The purpose in making this book has been to get together the essential data as to efficiency and cost of the various types of motors and to present it with such accuracy and detail that it will be useful for the expert engineer, and with such simplicity that it will guide, in simple cases at any rate, those who cannot avail themselves of expert aid. While the author has not the slightest notion of eliminating the engineer he does think that it would be an advantage both to the engineer and to his client that the client should be so well informed that he can bring his case to the engineer reasonably well arranged.

The author begins with the consideration of animal power, then passes to wind motors, then to water motors of all types, then to steam engines and boilers, and finally to gas, oil and hot-air engines. There is a short chapter on the "Storage of Power by Electricity and Its Reconversion," and another one on "Shafting and Belting."

An idea of the method of the book may be given from the treatment of the steam engine. Under this head, after some general and elementary considerations, the first topic taken up is fuel, in which the relative efficiency of various fuels is taken up and figures are given of the extra cost of large fireboxes for burning wood or straw to supply steam to engines of horse powers varying from 2 up to 38. Next the subject of steam pressure is briefly considered and a simple expansion engine recommended for low pressures, double expansion for pressures from 100 up to 125 lbs., triple expansion up to 170, and quadruple for higher pressures. Data are given of average water consumption in various engines.

The chapter dealing with condensers and feed-water heaters is a clear treatment of the subject. A table is given of the economy resulting from feed-water heater, and the subject of heating factories by means of exhaust steam is briefly mentioned. The chapter on Vertical Engines embraces double and triple expansion engines for marine work, after which a chapter is devoted to Special Types of Steam Engines, and another to Horizontal Engines.

Portable engines, Boilers, Chimneys, etc., follow in the order named. The list of general essentials for good boiler work is too brief, lacking, for instance, rules for rivet calculation. The chapter on Tubulous Boilers occupies less than four pages, which seems far too little space for a useful treatment of the subject. Those on Chimneys, the Expansion of Gases, and the Explosion of Vaporized Mineral Oil, are much more complete.

A feature of the tables given throughout the book, is the column of prices given with the various turbines, engines, motors, etc. This makes it possible to get the approximate cost of any proposed installation, without reference to various catalogues and price lists, generally not at hand when wanted. In making rough estimates, such figures are of considerable value.

Proceedings of the International Conference on Aerial Navigation, held in Chicago, August, 1893. 430 pp., octavo, with illustrations and index. New York. *The American Engineer and Railroad Journal*, 1894.

The Flying Congress of the World's Columbian Exposition of 1893, was one of the least known (to the great public) and one of the least attended of the many congresses of that wonderful summer. But the gentlemen who took part in it doubtless felt that they were of the saving remnant, destined to uphold and demonstrate a real but little understood science before a scoffing world. The varied, ingenious, and, in some cases, learned papers, which they contributed to the Congress with the discussions thereon are collected in the volume before us. There are in all 36 papers.

The most important general discussion is the long paper on the "Problem of Aerial Navigation," by the late C. W. Hastings. A valuable special study is on the materials of aeronautic engineering by Professor Thurston which takes up the strength of materials with reference to their weight, and will be valuable to other engineers than those who are trying to design flying machines.

The most curious and interesting special paper is that of Professor Langley on "The Internal Work of the Wind." In this paper is developed the remarkable theory that it is possible that a heavy body wholly immersed in the wind may be driven directly against the wind, without the use of any other power than that furnished by the wind itself. The source of this power is found in the constant and rapid pulsations in the air, these fluctuations in relative velocity being greater, the higher the absolute velocity of the wind. Thus Professor Langley explains the soaring of birds and thus he finds a force that will enable an "aerodrome" to circumnavigate the globe without alighting, carrying only fuel enough to enable it to take care of itself in exceptional moments of calm. In the discussion such men as Prof. DeVolson Wood and Prof. J. B. Johnson express their doubt of the adequacy of Professor Langley's theory and their surprise that so able a scientist should have gravely put it forward as sufficient.

The collection of papers reveals about all that is known, and that is not known, about flying; and makes in itself a sufficient literature of the subject for most men, more, in fact, than most of us will ever care to read.

The Independent, 130 Fulton street, New York, has issued (June 6) its annual railroad number. The topics and authors are: Railway Prosperity Essential to Industrial Progress, O. D. Ashley; Postal Cars on City Railroads, A. T. Sullivan; The Relations Between Managers and Employees of Railroads, M. E. Ingalls; Electricity or Steam? H. G. Prout; The Limitation of Governmental Regulation of the Railroads, Joseph Nimmo, Jr.; Great Feats in Railroad Engineering, Charles Paine;

How the Wants of Railroads are Supplied, A Member; Responsibility of the Public in Railroad Strikes, C. M. Hobbs; The Margin of Profit in Transportation, Thomas L. Greene; Railroads in Siam, Will M. Clemens; How a Railroad Keeps Track of its Cars, Edgar Van Etten; Eastbound Rates on Western Food Products, J. W. Johnson; Contemporary English Railway History, W. M. Acworth; How I Became a Car Conductor, F. T. Slack; Reduction in Railway Rates, H. T. Newcomb; How I Became a Locomotive Engineer, George E. Fisher; South American Railroad Working in 1894, Prof. Courtenay DeKalb; The Intercontinental Railway Commission, E. E. Steever.

TRADE CATALOGUES.

Steam Fittings. The Van Auken Steam Specialty Co., 201-7 South Canal street, Chicago, Ill. 1895.

This company manufactures steam engineering fittings such as air-valves for radiators, steam trap, pressure regulators, pump governors, etc. The illustrations are numerous and of fairly good quality.

Mechanical Rubber Goods. The Boston Belting Co., Boston, Chicago and New York. 1895. Railroad Edition.

This catalogue is an M. C. B. standard size price list of mechanical goods such as are generally used by railroad companies. The various articles listed are well illustrated and described, making the book a covenient one for ready reference.

Light Cars.—The Sheffield Car Co., Three Rivers, Mich. 1895.

The uses of light cars are so manifold that this pamphlet of 100 pages is fully taken up in illustrating and describing them. The illustrations are good and embrace track velocipedes, various dump cars, light flat cars, cars for plantation, mining, shop, tunnel logging and other uses, and various specialties. The press work is excellent.

Russel Snow plows.—The Ensign Manufacturing Co., Huntington, W. Va, and 11 Pine street, New York. 1895.

This pamphlet sets forth the merits of the Russel snow-plow, by means of extracts from papers, and a number of half-tone illustrations. The pamphlet is not regulation M. C. B. size, but it is adapted to the photographic reproductions used. Many testimonials of satisfactory use of the plows are given, coming from various railroad officials.

Lubricators.—Railroad Edition. The Detroit Lubricator Co., Detroit, Mich. 1895.

This standard size catalogue and price list deals with lubricators, injectors, etc., for locomotives, and gives prices for the same. Records of performance are given to show the superiority of the Garfield injector, made by the company. A supplemental steam dome for locomotives is described and illustrated.

Dry Kilns, Pot Blast Heating Apparatus, Ventilating Fans, etc. A general illustrated catalogue of the Huyett & Smith Manufacturing Co., Detroit, Mich.

This company has just issued a fine catalogue of 140 pages, 7 in. × 10¼ in. The wares of this company are too well-known to need particular mention. Ventilating fans, blowers, high speed engines, exhaust fans, fans for handling material and hot blast apparatus are shown in considerable variety. Electricity is applied as a motor to various apparatus manufactured by the company.

Classification of Passenger Traffic in England.

Almost from the first three classes of accommodation for passengers have been provided by the English companies, but the English law, while fixing in the charter of every company the maximum rates to be charged for each class, has never made other efforts to control the accommodations furnished or to insure a constant ratio of fare or service. These matters have been left, as was doubtless best, to be settled on purely business principles and the results have been quite various.

On the roailroad coaches hauled by horses on the Stockton & Darlington Railroad, between 1825 and 1833, the ordinary fare for the journey of 12 miles was 1s. 6d. inside and 1s. outside.

In 1833, when steam locomotion superseded horse power, two special coaches, "put on springs and kept clean and neat," were attached to each train, for a seat in which 2s. inside was charged. Thus, as 1s. 6d. only still appears to have been charged to inside passengers in the other coaches, we have here the division into three classes already introduced, with, curiously enough, the same gradation of fares., viz., 2d. per mile first-class, 1½d. per mile second-class, and 1d. per mile third-class, as obtains on many English railways at present. Thus from the first a penny a mile fare was charged between Stockton and Darlington, and, though so low a rate was not common yet generally on local lines in industrial districts third-class passengers were not unhandsomely treated in the first decade of English railroads, being booked by all trains, and, in a few instances, conveyed in covered carriages furnished with seats. An important exception to this rule, however, was the Liverpool and Manchester Railway, which for the first 14 years of its existence provided first and second-class carriages only.

Meanwhile, on the longer lines and on the through outes third-class traveling was in a very arlous state, indeed. Here the fare was nearly, when not quite, 1½d. per mile, and for this sum the third-class or "wagon" traveler, as he was frequently called, was conveyed on trains containing horse and cattle trucks and empty wagons, and even on heavy freight trains, in carriages which usually had no roof, often no seats, and, of course, no windows, and of which the sides were only 2 or 3 ft. high till they were heightened at the urgent representation of the Board of Trade. In other words, the poorer class of traffic was encouraged only in localities where it already existed or could be easily called into being; but at a time when there was little or no long-distance traveling except among the well-to-do, it was the paramount policy of the companies to prevent these from using the cheap class when they could well afford a better style of conveyance. Moreover, the method of levying the passenger tax in vogue at this time, viz: at the rate of ⅛d. per passenger per mile, irrespective of class, was a very serious obstacle to a reduction of fare, even where the railroad companies were so inclined. Under these conditions the regulations of the companies were framed, to quote the words of a contemporary writer "not with a view to encourage traveling generally, but to make the most of such as are obliged to travel."

The Board of Trade, which in 1842 held an enquiry into the conditions of third-class traffic, thought it "questionable whether the interest of the proprietors of these lines (*i. e.*, the long lines), would ever lead them to encourage the development of a third-class traffic." Still in this time one finds the question of cheap fares freely canvassed, a few bold and far-sighted spirits (among them Sir Robert Peel) advocating them on commercial grounds. The result of the agitation was the Cheap Trains Act of 1844, which compelled every company to run at least one train daily in each direction over its lines at a rate of not less than 12 miles an hour, stopping at every station if required, and conveying passengers in carriages provided with seats and protected from the weather, at a fare not exceeding a penny a mile. In 1842 the original form of passenger tax above referred to had been altered to a duty of 5 per cent. on the gross receipts from passenger traffic, and by the act of 1844 penny-a-mile traffic was exempted even from this tax. Thus a serious obstacle to cheap fares was removed and an irreducible minimum of third-class accommodation created; but higher than this English railroads for nearly 30 years longer showed little disposition to rise.

Thus, a rather favorable example of third-class, or penny-a-mile, service in the fifties was the train of third-class carriages, "covered in with side-doors and seats," which the London & Northwestern started from its London terminus every morning between six and seven o'clock to arrive at Manchester, Liverpool and Leeds the same evening. At Blisworth, 63 miles from London, this train was regularly delayed an hour and a half, to allow the mail and three other quick trains to pass, and for the purpose of warming and refreshing the passengers, for whom a large and commodious room was here provided. The object of this stoppage is expressly stated to have been "to prevent the use of the train by those for whom it is not intended." Still, including stoppages, the average speed was 15 miles an hour.

Fares at this time varied a good deal on different lines, but the average was settling down to about 2d., 1½d. and 1d. a mile for the respective classes on the Northern lines, and 3d., 2d. and 1d. on the roads running southwards from London. Several companies, however, notably the Great Western, made a distinction which was long maintained between Parliamentary trains (as those enforced by the Act of 1844 were called) and other third-class traffic. For the latter fares at the rate of about 1¼d. a mile were charged for conveyance in third-class cars on a few fast trains of a secondary character. Though small, of course, as compared with what came afterwards, the growth of third-class traffic in the period which ended in 1871 was very striking. In that year the London & Northwestern carried over 264 million third-class passengers. In 1843 no Northwestern Company existed, but the third-class traffic on the London & Birmingham (a part of what afterwards became the bigger company) amounted to 50,000 passengers only.

In 1872 the Midland Company made the great innovation of carrying third class, penny-a-mile passengers by all trains, thus destroying the difference in speed of traveling, which up to that time had been a most important distinction between the third and the two higher classes. In this change "the pioneer company" (as it came to be called) was immediately and necessarily followed by competing roads, and more slowly but almost universally by others, so that at present the number of trains in the United Kingdom from which penny-a-mile passengers are excluded is very small. This was a revolution, but not government benevolence, nor the stress of public demands, but the commercial instinct of the manager of a profit-earning enterprise was the main instrument in working the change. Sir James Allport was clear-sighted enough to see that 40 years of railroads had made general traveling a necessity, and had educated even the poorer classes to travel not only for necessity, but out of curiosity and for pleasure. Consequently the source from which passenger receipts were to be drawn was no longer, as at first, a strictly limited one from which the highest possible fares must be extracted. On the contrary, by lowering the fare, more travelers could be obtained practically without limit; expansion of traffic need in the future be measured only by the facilities that could be profitably offered to it.

It is curious that the Midland is chiefly known to fame as the abolisher of second-class carriages, when it is really the third-class, the old speed-restricted, comfortless third-class, as it existed up to 1872 in England and as it exists to the present day in many parts of the continent of Europe—that Allport deserves the credit of having destroyed. In name, however, it was the second-class that was abolished on the Midland and in fare the first-class. In 1875, as a natural corrolary of the revolution of 1872, which had practically equalized second and third-class in everything except rate of fare, second-class carriages on the Midland were all renamed "third-class," the name of second-class was dropped, and, with a view of diminishing the gulf in price between the two classes that remained, and also in pursuance of the policy of encouragin traveling by cheapness, the first-class fares were brought down to the former second- class level of about 1½d. per mile.

There can be no doubt that this series of changes has been of great benefit to the traveling public in England, but whether they were justified commercially has been, and still is, a disputed point.

The penny-a-mile traveler has been admitted to one privilege after another, till now he enjoys not only the same speed as higher paying passengers, but many similar, if less luxurious, accessories of accommodation, such as cushioned seats, racks and upholstery, lavatory conveniences, and on the roads between London and Scotland, well-appointed dining-cars. At the same time many new comforts have been given to the two higher classes of passengers, but the utmost that has been done in this direction has been barely sufficient to maintain between the three sorts of conveyance any gradation of accommodation to correspond to and justify the gradation of fare.

But gradation of accommodation is only one side to the question of passenger classification in England. There is another side to the matter—a social side. This was well expressed by Sir George Findlay, when he wrote, in explanation of his company not having followed this Midland lead as to the second class, that the "North-western Company believe that society in this country, for all purposes, naturally divides itself into three classes, and that the wants and tastes of the community are best served by their present practice, in which belief they are supported by the great body of railway opinion in the country." Even the Midland felt this argument to be so strong that almost at the same time that they abolished the second class on the ground that its place has been taken by the improved third, they imported Pullman cars from America, and by charging a sum for the use of these above first-class fare, set up the three classes again on their express trains, in fact though not in name. The same feeling as to the naturalness of three classes prevented any other company from tampering with the old-established arrangement for more than ten years.

About 1887, the Great Northern began to experiment with dropping second-class cars, and were so far satisfied with the result that they now retain the intermediate class on their London suburban services only. The Great Eastern also has for some years adopted the same compromise. The Midland, therefore, still stands alone in running no second-class cars in and out of London for its suburban traffic. On the other hand, two important but purely provincial companies, the North Eastern and the Manchester, Sheffield & Lincolnshire, have followed the Midland lead in abolishing second-class carriages entirely. But another important provincial line, the Lancashire & Yorkshire, retains the intermediate class, probably for the reason that its territory being very thickly populated, much of its traffic partakes of a suburban character.

With regard to the reduction of first-class fares to the former second-class level of about 1½d. per mile, which was an important part of the Midland pioneer policy, the North Eastern and the Sheffield companies have followed the lead in this also, while the North Western and Great Northern have perforce adopted the same scale on competitive routes. But on the few routes belonging to these companies, which are unaffected by competition, the old ratio holds good, viz., 2d., 1½d. and 1d., a penny a mile for the respective classes, with the addition of the passenger duty—5 per cent—to the first and second-class. A slightly higher ratio obtains generally on the Great Western, Great Eastern, Brighton, South Western and Lancashire & Yorkshire systems for first and second-class, but it should be mentioned that these companies generally give a liberal reduction to passengers in these classes who take return tickets, whereas such reductions are very small on the Lancashire & Northwestern, and Great Northern, and are not given at all on the Midland. As to the South Eastern and London, Chatham & Dover companies, up to the beginning of the present year the fares charged by these companies were on a very high scale on non-competitive routes and on routes where pooling agreements ruled. But in the county of Kent keen competition between the two companies had reduced many fares even below the north of England level, while here was found also what existed, on few other roads, a general reduction on third-class penny-a-mile returns. From the commencement of 1895, however, these two companies have by agreement revised their fares to bring them more in accordance with the scales in force on the principal roads running northwards from London, and the revision has been conducted on the basis of 2d. per mile first-class, 1¼d. per mile second class, and 1d. per mile third, with a reduction of ½d. per mile on return tickets for first-class passengers only.

Finally, to give a more general view of the relation between the three classes in England in the matter of

fare, it may be mentioned that calculations based on 76 per cent. of the total mileage of the railways of England and Wales, embodying the result of the average of several stations at various distances upon the different railways, show that the average first-class fare charged is 1.94d. per mile, the average second class 1.50d. per mile, and the average third class 0.97 per mile.

We may sum up by saying that first, second and third-class traveling on English railways have constantly varied, both intrinsically and relatively, as to speed, accommodation and fare; and while the division into three classes has at bottom a social significance and sanction, the form that it has assumed at various times and in various parts of the country has been decided mainly on commercial principles, with a view of giving travelers the amount and kind of service they were willing to pay for and to use in the largest numbers. In short, though it has been complicated by social considerations, the classification of passenger traffic in England has always stood on a business footing, and there are many signs that efforts to make that footing a firmer one will shortly be made in several quarters.

C. H. GRINLING.

LONDON, Feb. 18, 1895.

TECHNICAL.

Manufacturing and Business.

The Michigan-Peninsular Car Co. has issued a circular announcing that the company is again compelled to pass its preferred stock dividend. The management feels much encouraged by the brighter outlook and the return to normal business in the near future. The pipe works, rolling mill, forge and the Peninsular car plant have been in full operation during the greater part of this quarter and present orders will keep them employed until the middle of July. One order is for 3,000 tons of iron pipe for the Toledo City Water-Works, Toledo, O.

The Denver City Cable Co. will equip all its cars with the Pintsch gas lights.

The Vulcan Iron Works, of Chicago, have orders for a pile driving car for the Kansas City, Osceola & Southern Railroad; for two 2½-yard steam shovels, new design, from the Shailer & Schniglau Co., for use on the Chicago Drainage Canal, and for a very large swivel pile driver, fitted up with double cylinder, double drum engine and a large size Warrington-Nasmyth steam hammer for the Missouri River Commission.

T. W. Ridsdale and T. A. Lewis, comprising the firm of Ridsdale & Lewis, dealers in machinery and supplies at No. 39 Cortlandt street, New York, have made an assignment to Edward Swann without preference. They began business in May, 1894.

H. L. Smith, of Albany, N. Y., Receiver of the Albany Horse Nail Co., is offering for sale a very valuable plant in excellent condition for manufacturing purposes. The buildings have a frontage on the Hudson River and are within 50 ft. of a railroad. They were erected especially for the company at a cost of $75,000, but were never used, owing to the failure of a machine to be used for the manufacture of horse nails.

The Western Construction Co., with offices at Kansas City and St. Louis, has filed articles of incorporation in Kansas. The capital stock is $20,000, and the directors are: John R. Price, C. H. Monahan, D. W. Smith and J. L. Kimball, of Kansas City, Mo.; A. H. Cobb, U. V. Widener and Edward Haren, of Kansas City, Kan. The new company is formed to construct railroads and other work of related character.

The firm of R. W. Hildreth & Co., of New York, one of the prominent firms of inspecting engineers, now consists of R. W. Hildreth and Alfred Liebmann, Mr. Liebmann entering the firm on the retirement of Mr. Percy S. Hildreth. The offices will continue at 50 Broadway, New York City.

The Consolidated Cattle Car Co. has filed articles of incorporation at Belleville, Ill. The capital stock is $2,000,000. The incorporators are Edward S. Robert, Daniel G. Taylor and Elenious Smith. Joseph Dickson, Union Trust Building, St. Louis; C. E. Kimball, Elenious Smith and Henry A. V. Post, of New York City, are the stockholders, the latter owning all but three of the shares.

Articles of incorporation were also filed by the Illinois Rolling Stock Co., which is connected with the Consolidated Cattle Car Company, having the same incorporators. The capital stock is listed at $30,000.

Henry L. Leach, 70 Kilby street, Boston, has issued a statement showing shipments of the Leach pneumatic sanding apparatus for locomotives during the month of May. From this it appears that 83 sets were shipped during the month, of which 49 were delivered directly to locomotive building firms. The orders included 6 sets for the Pennsylvania road, 8 for the Grand Trunk (for engines running through the St. Clair Tunnel), 6 for the Delaware, Lackawanna & Western, 8 for the Southern Railway engines building at Richmond, 8 for the Seaboard Air Line, also building at Richmond, 16 for the Southern Pacific engines building at Schenectady, and 5 for engines of the Beech Creek Railroad.

Iron and Steel.

Another voluntary increase of about 10 per cent. in the wages of all the furnace employees in the Mahoning Valley in Ohio was announced this week by the blast furnace operators, the advance to take effect June 15.

It is announced from Pittsburgh that the Carnegie Steel Co. will build two more furnaces, to be started up in the fall, and that the company is now negotiating for Lake Superior ore lands. This extension of business is supposed to have some connection with the reports of a great steel plant to be erected by the Rockefeller syndicate on the Lake Erie shore. The Allegheny mills of the Oliver Company, which have been idle for two years, have partially resumed, so that with a couple of exceptions all the Pittsburgh plants are in full or partial operation.

New Stations and Shops.

The Northern Pacific Railroad will build a new passenger station at Little Falls, Minn., to cost about $5,000 if the city will close certain designated streets to permit of an enlargement of the yard room. The new building will be nearer the business part of the town than the present station, which will continue to be used as a freight house.

The Boston & Albany has started up its new repair shops at West Sprinfield, Mass., and they are now running to their full capacity. The former large shops on Cypress street in Springfield have been closed. The erection of the new shops at West Springfield was commenced last fall. They have been equipped with new machinery almost entirely, no tools or machines being removed from the old shops.

The Seaboard Air Line will close the wood-working department of its shops at Raleigh, N. C., and the equipment will be removed to the wood-working shops at Portsmouth, Va., where most of the wood work of the system has been done for the last year or two.

The Seaboard Air Line will at once build a new passenger station at Aberdeen, N. C., on the Raleigh and Augusta division, to take the place of the one recently burned.

New Ships for the Navy.

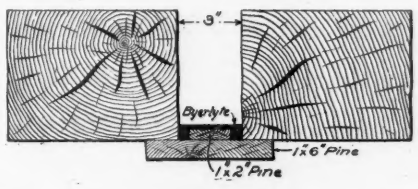
It has been decided to build two new battleships for the navy with double turrets, the smaller turret being placed vertically above the larger one. The upper turrets will carry 8-in. guns and the lower ones 13-in. guns. Plans are being prepared upon this design at present. In addition to these vessels the Government is about to build three new torpedo boats, somewhat larger than those for which contracts were recently allotted. Their displacement will be about 185 tons and their speed 25 knots an hour. Water tube boilers will be used and the engines will be of 3,100 H. P. The bill provides that one of these vessels shall be built on the Pacific Coast, one on the Mississippi and one on the Gulf of Mexico.

Launch of the British Warship Terrible.

This new addition to the British navy was launched on the Clyde May 27. She is a first class steel cruiser, copper sheathed, and of 14,250 tons displacement. Her indicated horse power is 25,000, and her speed is estimated at 22 knots. She is 531 ft. long and 71 ft. beam. She will be armed with two 22 ton, 9.2-in. guns, and 12 6-in. quick firing guns. In addition there will be 37 guns of smaller caliber. This vessel and her sister ship, the Powerful, are the largest cruisers in the world. The coal supply of each vessel is 3,000 tons, so that they can remain at sea for a long period. These vessels have twin screws. Protection is afforded by a curved steel deck about 4 in. thick. Unless the estimated speed is considerably exceeded, these vessels will not prove as fast as the Columbia.

Protecting a Bridge From Rusting.

Owing to the salt drippings from the large number of refrigerator cars hauled by the Michigan Central Railroad, it has become necessary to adopt some means of protecting the cantilever bridge over the Niagara River from rusting. The ties on the bridge are laid with 3-in. spaces. Boards 1 in. thick are nailed across these spaces



on the under side of the ties. A composition is then poured in consisting of byerlyte (which is a residual product in the refining of crude petroleum) mixed with a little dead oil of coal tar. At one end of the ties an eavestrough is placed to catch the brine, which is carried below the ironwork by conductor pipes. The arrangement is shown in the sketch.

The Baltimore & Ohio Electric Locomotive.

One of the General Electric Co.'s locomotives for the Baltimore Belt Line tunnel has been received in Baltimore and will be set up this week. We are informed that it cannot go into operation at once, as the Baltimore & Ohio people and the Pennsylvania people have not agreed concerning the electric work over the tracks where the Belt Line crosses the Bolton station yard.

The Smith Triple Expansion Exhaust Pipe.

There can be no question that the Smith triple expansion exhaust pipe is a device, the importance of which is worth serious attention. A good deal of evidence has been accumulated as to its merits. Letters from the mechanical heads of some of the most important railroads give results which sustain the claims made as to saving of fuel and increasing hauling power. Several important railroads have adopted the Smith exhaust pipe as standard, and are putting it on new engines as fast as built. Since the introduction of the 1894 pattern, about a year ago, it has been placed on from 45 to 50 roads. Those who really care to look into the matter can get a good deal of evidence by applying to the General Agency Co., 32 Park Place, New York, the sole agents for the device.

Water Power of the Falls of St. Anthony.

During the past few weeks bonds have been finally placed to the amount of not less than $600,000 for the purpose of building a new dam to utilize the entire power of the Falls of St. Anthony, at Minneapolis, Minn. Work on a second dam, which will not use all the remaining fall, however, has begun. The new dam will be built of stone masonry, and there will be a fall of 20 ft. at the turbines. This will develop a power at the lowest stage of water of 4,000 H. P., while for eight months of the year it will furnish 10,000 H. P. The dam will be 820 ft. long, and there will be a power house in which will be installed, as occasion may warrant, 40 turbine wheels of an average power of 250 H. P. It is estimated that two years will be used in completing the work, and the cost will not be far from $700,000. The power developed will be for sale at any desired spot except at the dam, in the form of electric energy. It is not known who will use this power, but the Twin City Rapid Transit Co., operating all the street car lines in Minneapolis and St. Paul, and one of the largest companies in the country, has negotiated for it. If not used by the street railroad it will be used in flour mills and similar works.

THE SCRAP HEAP.

Notes.

The insurance agents on the lakes say that up to May 21 the marine losses this season amounted to $836,373, more than four times as much as for the same time last year.

The Governor of Pennsylvania has approved a law just passed requiring the state to rebuild county bridges on public highways when such bridges are destroyed by fire, flood or storm.

At Shelby, Miss., on May 31, four men tried for conspiracy to wreck a train were "proved guilty, and fined $25 each." Not much of a conspiracy, if we may judge by the amount of the fine.

Dangerous bending of rails by the heat was reported from various places during the very hot weather of the first week of June. In one case in New York State, according to the accounts, the rails were from 6 in. to 24 in. out of line.

The Cleveland Rolling Mill Co., now ships liquid molten iron, on ladle cars, over the tracks of the New York, Pennsylvania & Ohio between Cleveland and Newburg, a distance of about five miles. When the rolling mills are in operation trains are run several times a day, about two hours apart.

The steamer North West made the trip from Chicago to Mackinaw City on June 7th and 8th in 17 hours and 10 minutes, being at the rate of 19.05 miles an hour, and 2 hours and 5 minutes quicker than the fastest previous record between these points. On the evening of the 8th she started from the Soo for Duluth and ran to that city in 21 hours, 48 minutes, equal to a little over 18 miles an hour. On June 6the North Land, the other big steamer of the Northern Steamship Company, ran from Cleveland to Buffalo, 183 miles, in 8 hours 53 minutes, an average of over 20 miles an hour.

The Great Salt Pond & Atlantic Canal.

Work has been going on for almost a year in dredging a canal between the Great Salt Pond in New Shoreham, Block Island, and the Atlantic. This canal opens a passage into the lake, capable of allowing ocean steamers to pass. The lake provides a land-locked harbor of considerable value. The canal is now almost completed, a breach having been effected at its ocean end on May 25.

Cable Road for Brussels.

An underground cable road is being talked of for the city of Brussels as a means of relieving, to some extent, the present overtaxed traffic facilities above ground. The estimated cost of the road has been placed at 3,000,000 francs, or about $600,000.

Inspecting the Nicaragua Canal.

The committee appointed to examine the plans and route of the Nicaragua Canal, reached their destination on May 13. Since then they have been going over the work. The breakwater was first inspected. Here, as was to be expected, the piles and timber were found to be much eaten by the teredo. The damage by the teredo is about the only evidence of deterioration which the Commission has seen. The dredged section of the canal is in excellent condition. The high embankments on the sides have stood the action of the weather remarkably well. The condition of the company's buildings is also gratifying. All of them, from La Fe to the hospital, have been visited and found to be in an excellent state of preservation.

The Commissioners went over the whole line of the railroad on May 16. This trip from Greytown to the terminus at Camp No. 7 was made on a hand car at an average speed of about eight miles an hour. The condition of the road after so long a suspension of work was the subject of favorable and general comment. The embankments are firm and well settled, presenting a uniform grade as originally laid down. The track is in excellent condition, and a locomotive and train of cars might even now run over it in perfect safety.

The Page Fence Seeks New Fields.

We have received from the Page Woven Wire Fence Co. the following letter: "Our railroad salesman, Mr. E. G. Fisher, will sail on the steamer New York, June 12, and represent us at the International Congress in London. Our success with first-class roads in this country leads us to undertake a little missionary work abroad. Possibly the recent sale of 10 miles for a government railroad in South Africa also had its influence. By the way, the *Railroad Gazette* might claim credit for that sale, as it was mentioned in the first inquiry. The Detroit *Free Press* claimed it was the result of the administration's liberal foreign policy, while we 'blame it on elasticity.' Our object in writing is to bespeak the friendly aid of the *Gazette* for Mr. Fisher, as we have our doubts as to the self-adjusting qualities of his French and German, and are quite sure he will 'sag' terribly when he attempts to speak Russian."

The Alpine Tunnel.

The Denver, Leadville & Gunnison will formally reopen its tunnel through the crest of the Continental Divide on June 15, after which date regular trains will be run to and from Gunnison. The grade approaching the tunnel is 211 ft. per mile both sides and the cost of hauling freight is quite heavy, even in good weather and under favorable conditions. But, as Gunnison business is increasing and is better than at any time during the past 10 years, it is believed that the Gunnison line will now pay operating expenses with possibly some profit. The passenger department is doing a considerale amount of advertising in order to attract tourists.

International Railroad Congress.

Mr. J. R. Roosevelt, Secretary of the United States Embassy at London, will represent the United States at the International Railroad Congress.

Interlocutions—No. 2.

"What is the best form of signal?" asked the Crank one day, not that he really wanted to know or cared anything about it, but he had been somewhat disagreeable to the Semaphore of late and, having offended, now wished to mollify him.

There was a long pause, so long that the Crank became impatient. "Wake up," he said, "any one would think that you were a member of the committee on sealing of the Alaskan Roadway Association trying to decide whether to put mile posts 1 mile or ½ mile apart."

"I do not object to your comparison," returned the Semaphore with great dignity; "we have both of us done good work which should protect us from the attacks of grovellers like you. There was a time—but never mind," he added with a sigh. "Your question reminds me of a story that a relative of mine told to me. He was a crosstie in a side track and lay quite close to me so that we had many intimate conversations, but he had earlier in life been a draft timber in a passenger car and consequently a great traveler. There was a farmer's wife once rode with him who was going to town to buy a churn and, since she returned with him also, he learned the whole result of her visit. She had saved her butter and egg money for many years and made up her mind that she would have the best churn that could be bought. So she wrote to all her family to learn about churns; some of them did not answer her, others answered but said that they preferred not to express an opinion on churns, while one of them said that she ought not to get a churn at all, but a washing machine. In the meantime she had been receiving visits from agents and heard of many fine churns, automatic, semi-automatic and others, but the one she liked best of all rang a bell to tell when the butter had come. This she would have bought if the agent of a rival churn had not told her that sometimes the bell rang too soon and at other times not at all. When she reached town she looked at the churns in all the stores, but dinner time came and she was still unsuited, so she went to call on her brother-in-law, where she knew that they would invite her to eat. While there she was shown a parlor organ, not much the worse for wear, that they would be glad to sell cheap and it seemed a great bargain. When she thought of the beautiful music they might have as soon as her daughter M'ria could learn to play on it the temptation became too great, so she bought it and forgot all about the churn."

When the semaphore had paused for breath the disgusted crank interrupted, "Might I remind you that I did not ask for any of that drivel, but simply as to what is the best form of signal."

"M-m-m; oh yes; why the sema-form, of course," responded the old fellow, with a feeble attempt to wink his upper spectacle.

Grade Crossing Improvement at Boston.

The New York, New Haven & Hartford Railroad Company has awarded two large contracts for what is known as the Jamaica Plain improvement at Boston, involving the raising of tracks, the eliminating of grade crossings, and the construction of a fourth track into Boston. One contract was awarded to H. H. Brown, of New York City, for work amounting to $640,000, the other to J. O'Brien, also of New York City, for $700,000. Similar contracts for work at Brockton, Mass., have been awarded to Dwight and Daly, of Boston, for $325,000.

A New Pipe Line.

The Wabash Fuel Co. recently signed a contract for the construction of a second pipe line from the natural gas fields to Wabash, Ind. The line will be 18 miles long and 8 in. in diameter, with 17 miles of street piping. The cost of the work will be about $100,000.

LOCOMOTIVE BUILDING.

The Delaware, Lackawanna & Western has just put in service two engines built at the Utica shops of the company. The engines are built to burn fine anthracite coal and have extra large fireboxes and grate surface. The engines weigh 112,000 lbs. each in working order.

H. K. Porter & Co., of Pittsburgh, who generally are busy on engines of widely varying weights and types, have recently been working on orders for engines of unusual weights. They have recently built one of the heaviest locomotives ever built at the shops, a 4-wheel shifting engine weighing nearly 40 tons in working order. A recent order was for an engine with cylinders 5 in × 8 in., weighing 3½ tons, the lightest ever built at the works. The locomotives built in the last few months have included engines for coal mines, coke ovens, iron, silver and phosphate mines, quarries, logging roads, plantations, steel works, contractors' service, for export and compressed air mine locomotives.

During the last year and a half or so, H. K. Porter & Co. have taken advantage of the recent dull times to make important improvements in their shops. These are now about completed and more than double the previous capacity of the works. They have put in a full equipment of modern tools, have built a new machine shop, erecting floor and blacksmith and carpenter shops, and a new boiler shop, the latter being the most recent addition and just completed.

The Rogers Locomotive Company has recently received an order for building four two-cylinder compound locomotives for the Government railroads of Chile. Two of the engines are to be 8-wheelers and two 10-wheelers. Other orders which the Rogers Locomotive Co. is now working on include one for 15 engines from the Louisville & Nashville, as already stated in these columns, and one 10-wheel locomotive for the Atlanta & West Point railroad. Two switching engines with 14-in. × 20-in. cylinders have just been delivered to the Cross Creek Coal Co., of Pennsylvania, and two 8-wheel locomotives, 18-in. × 24-in. cylinders, have been shipped to the Galveston, La Porte & Houston Railroad in Texas.

CAR BUILDING.

The Elliott Car Co., of Gadsden, Ala., has just received an additional order from the Southern Railway Co., the last contract being for 200 gondola cars. This order with the former orders from the Southern Railway Co., for 50 ventilated box cars, will keep the works busy for some little time. The Elliott Car Co., has also recently closed a contract for 3,600 car wheels for the Mexican Central Railroad to be delivered to that company at Tampico, Mex. This is said to be the first large order for car wheels for Mexico ever placed with a foundry in the United States.

The Baltimore & Ohio Railroad has awarded to the South Baltimore Car Works a contract for repairing 1,300 freight cars. The works have also received a contract for 50 new eight-wheel cars for the Merchants' Coal Co.

The Boston & Maine order for 600 cars was given out this week, the Laconia Car Co., of Laconia, N. H., receiving the contract for the entire order. The cars include 200 box cars, 200 platform cars and 200 coal cars, all of 60,000 lbs. capacity. The cars are to be equipped with the Gould coupler, but will not have air brakes. Extracts from the specifications were printed in the *Railroad Gazette* of May 10, 1895, page 289.

The specifications for the 20 first-class coaches and 4 mail cars ordered by the Southern Railway of the Pullman Car Company call for the Pintsch light and the Safety Company's system of steam heating by water circulation. The same appliances are also specified for the 10 Southern Railway express cars recently ordered of the Barney & Smith Car Company.

The Erie Car Works, at Erie, Pa., have started up under the ownership of Messrs. Hamilton & Knoll, who have bought 2½ acres of ground and some of the buildings belonging to the Erie Car Works Co., Limited. The first order of the new firm was for repairing 100 cars for H. K. Wick & Co., incorporated, and they are bidding on considerable new work. Mr. Hamilton was with the old company for 15 years and Mr. Knoll for 21 years. The present erecting shop is 222 ft. by 65 ft., with an L of 40 ft. by 20 ft. The forge shop is 100 ft. by 75 ft., but it is contemplated to erect much larger shops as business increases, an option having been secured on 20 additional acres. In addition to car work, the firm will make engine and boiler forgings. The shipping facilities are good, as the Lake Shore & Michigan Southern and the Nickel Plate roads have tracks on the grounds, and the Pittsburgh & Lake Erie is building a line to reach the shops.

Baltimore city railways are adding much new rolling stock to their present equipment. They are mostly open summer cars. The Baltimore Traction Co. has received 60 cars from the Brownell Car Co., St. Louis; the City & Suburban Co. will soon receive 75 new open cars, 50 from the St. Louis Car Co. and 25 from the J. G. Brill Co., Philadelphia; the Baltimore City Passenger Co., 54 new cars, and the Central 20 new open cars from the Brill Co., Philadelphia.

The Southern Pacific has placed orders with the Pullman Car Company for new equipment for the Sunset limited trains which the company runs semi-weekly during the fall and winter between New Orleans, Los Angeles and San Francisco. The contract is for the construction of the following cars for these trains:

Six vestibuled sleeping cars, with 10 sections and two drawing-rooms in each.

Two dining cars, which will be models of their kind.

Four composite cars, the front end partioned off and used for baggage, and balance of car provided with easy chairs and used for smoking, lounging and reading-room; also a barber shop, bathroom and cafe.

Four compartment and parlor cars combined, having seven compartments or drawing-rooms, which occupy half the space in the car, the balance being an observation parlor. All these cars will be equipped with the new wide platform vestibule.

The Wheeling & Lake Erie has been building recently at its East Toledo works a few 30-ton cars. A special feature of the car is its light weight and strength, considering its size. The inside dimensions of the coal box are 34 ft. 3 in. × 8 ft. 4 in. and 36 in. deep; capacity, 60,000 lbs. The weight of the car is 24,000 lbs. The cars are equipped with M. C. B. couplers, ventilated malleable iron corner bands, malleable iron stake pockets, and nearly all the castings, including the journal boxes, are of malleable iron. All the new cars of this company are 30 tons capacity, and the cars rebuilt or receiving general repairs are increased in strength and size from 20 to 25 tons. Malleable iron castings are substituted on all cars rebuilt or having general repairs.

BRIDGE BUILDING.

Boston.—The Secretary of War has approved the plans for altering the Chelsea bridge in this city. The wooden draw of the present bridge will be replaced by an iron retractile draw which will be 50 ft. wide, and give a greater headroom under the bridge. The old draw is 36 ft. wide.

Chester, Mass.—The following is a list of bids received for erecting a bridge over Westfield River: For plank floor bridges—Massillon Bridge Co., 2 spans 60 ft., $8,700; New England Engineering Co., 2 spans 60 ft., $8,400; Groton Bridge Co., 2 spans 80 ft., $8,390; Berlin Bridge Co., 2 spans 85 ft., $8,700; Hawkins Bridge Co., 2 spans, 85 ft., long truss, $7,989, and plate girder, $8,175; Canton Bridge Co., 1 span 178 ft., high truss, $9,200. Ballast floor bridges—New England Engineering Co., 2 spans 60 ft., $9 300; Berlin Bridge Co., 2 spans 85 ft., $9,850; Hawkins Bridge Co., 2 spans 85 ft., long truss, $9,185, and plate girder, $9,375. Stone arches—Melan Arch Construction Co. (Melan Arch with stone finish), 2 spans 55 ft., $9,410, and 3 spans 50 ft. or 2 spans 75 ft., $11,950; F. L. Kittridge, all stone, 3 spans 33⅓ ft., not including railing, $10,000.

Deerfield, Conn.—The Massachusetts Legislature just adjourned passed a bill authorizing the Greenfield & Turner's Falls Street Railway to construct a bridge across the Connecticut River between the towns of Montague and Deerfield.

Elmira, N. Y.—The Bridge Committee of Councils has been authorized to obtain specifications for the two new city river bridges to cost in the neighborhood of $115,000.

Freemansburg, Pa.—The County Commissioners have decided to erect a new iron truss bridge, and will advertise for bids shortly. Two plans were submitted to the Commissioners—one a cantilever bridge and the other a two-span truss bridge. The latter was decided upon. It will have sidewalks on either side.

Kansas City, Mo.—Farinsworth & Blodgett, Kansas City, have received the contract for the viaduct of the Kansas City Union Terminal Railroad crossing the Union Pacific and Missouri Pacific Railroads. It will consist of 20 ft., 50 ft. and 75 ft. spans on bents resting on foundations of piles capped with steel, concrete filled cylinders. The Pittsburgh Bridge Co. will furnish the superstructure.

Macon County, W. Va.—At a meeting of the County Court, at Point Pleasant, W. Va., on Friday last, the contract was let to the West Virginia Bridge Co., of Point Pleasant, W. Va., for a single span steel bridge, 115 ft. in length, over Crab Creek, in that county.

Maniwaki, Que.—The residents are hopeful of securing the erection of a bridge over the Gatineau River at this place, the neighboring municipalities and the Provincial Government having offered financial assistance. The Dominion Government will also be asked to grant aid.

New Britain, Conn.—The contract for the steel bridges for the Central Railway and Electric Co., of New Britain, Conn., for its various extensions have been placed with the Berlin Iron Bridge Co.

New York.—The Secretary of War has approved the general plans for a suspension bridge over the Hudson River, at New York, submitted by the New York and New Jersey Bridge Company, of New York, in which the New York and New Jersey Bridge Company, of New Jersey, joined. The Judge Advocate General advised him that all the requirements of the law had been met, and the Chief of Engineers approved the general plans and recommended their acceptance. The plans approved are those of the Union Bridge Company, described by us last week, page 358.

Governor Morton has signed the bill providing for a drawbridge on the Harlem River in New York City, between East 145th street and East 149th street.

Norwalk, Conn.—The contract for the four-track draw-bridge to be built by the New York, New Haven & Hartford Railroad at South Norwalk, has been awarded to the Pennsylvania Steel Co. The contract price is about $150,000.

Ottawa, Ont.—The bill to incorporate the Ottawa & Aylmer Bridge Co. has been passed by Parliament. The bonding power was reduced from $25,000 a mile to $20,000, and the amount for the bridge from $500,000 to $350,000.

Philadelphia & Reading.—The company is to build a new iron bridge at Leidich, Pa., to take the place of the present frame structure. It will be 127 ft. long. A contract for the iron will shortly be let.

St. Stephen, N. B.—The Milltown & St. Stephen Railway Co. is receiving tenders for building 4¾ miles of railroad and several bridges.

Sioux City, Ia.—It seems now assured that the so-called Pacific Short Line bridge across the Missouri River at Sioux City will be completed during the present year. The directors of the Credits Commutation Co., of Sioux City, which controls the charter and the property of the old bridge company, at a meeting at Sioux City last week finally decided to complete the structure as early as possible. The substructure of the bridge, which was built by Sooysmith & Co., of New York, is about completed, and that part of the structure can soon be finished. When work on the bridge was suspended in May, 1893, about one-half of the metal for the superstructure had been rolled, and part of it manufactured by the Phœnix Bridge Co. The Credits Commutation Co., which has now undertaken to complete the structure, is a reorganization of the Union Loan & Trust Co., of Sioux City, whose failure in 1893 involved the Sioux City Terminal Railway and the Union Stock Yards Co., which was building the bridge across the Missouri River. The municipality of Sioux City has recently voted a tax to aid in completing the bridge, and the directors of the Credits Commutation Co. have authorized an assessment of 10 per cent. on $1,000,000 of the stock of that company to secure additional funds to complete the structure. Mr. J. A. L. Waddell, of Kansas City, Mo., has been appointed Chief Engineer of the bridge.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Albany & Susquehanna, $3.50 per share, payable July 1.

Boston & Albany, quarterly, 2 per cent., payable June 29.

Boston, Revere Beach & Lynn, $2 per share, payable July 1.

Chicago & Eastern Illinois, quarterly, 1½ per cent. on the preferred stock, payable July 1.

Chicago & Northwestern, 1¾ per cent. on the preferred stock and 1½ per cent. on the common stock, payable July 5.

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1¼ per cent. on the preferred stock, payable July 1.

New York, New Haven & Hartford, quarterly, 2 per cent., payable July 1.

Rennselaer & Saratoga, $4 per share, payable July 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Canada Southern Bridge Company, annual, Detroit, Mich., June 16.

Northern of New Jersey, annual, Englewood, N. J., June 19.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Mechanical Engineers* will hold its annual meeting at Detroit, Mich., June 25, 26, 27, 28.

The *Master Mechanics' Association* will hold its convention at the Thousand Islands, commencing June 17. Applications for rooms for both the M. C. B. and M. M

conventions should be made to J. B. Wistar and Charles W. Crossman, both at Thousand Islands, Alexandria Bay, N. Y.

The *International Railway Congress* will meet at the Imperial Institute, London, England, beginning June 26.

The *American Society of Civil Engineers* will hold its annual convention at Nantasket Beach, commencing June 18.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *Northwestern Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month, at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets on the first Tuesday in each month, at 8 p. m. The headquarters of the society are at 1736–1739 Monadnock Block, Chicago. The business meetings are held on the first Wednesday at its rooms. The meetings for the reading and discussion of papers are held on the third Wednesday at the Armour Institute, Thirty-third street and Armour avenue.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7.30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7.30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month, at 7.30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. B. W. Gardner, Monadnock Block, Chicago, is secretary of the association.

The *Association of Civil Engineers of Cornell University* meets on Friday of each week at 2:30 p. m., from October to May, inclusive, at its association rooms in Lincoln Hall, Ithaca, N. Y.

Brotherhood of Railroad Trainmen.

The biennial convention of this brotherhood was held in Galesburg, Ill., on May 20 and the 13 following days. The following officers were elected for the ensuing term: Grand Master, P. H. Morrissey; First Vice-Grand Master, W. G. Lee, of Kansas City; Trustees, S. C. Young, W. L. McClure, O. Canada and O. L. Rolph. Mr. Morrissey has heretofore been the Frst Vice-Grand Master and succeeds Mr. S. E. Wilkinson.

American Institute of Electrical Engineers.

The general meeting of this Institute will be held at Niagara Falls June 25 to 28. Some of the papers which will be presented are as below:

The Substitution of Electricity for Steam in Railway Practice (inaugural address), by the President, Dr. Louis Duncan, of Baltimore.

Some Features of Alternating Current Systems, by Chas. P. Steinmetz, of Schenectady, N. Y.

Theory of General Alternating Current Transformer, by Chas. P. Steinmetz, of Schenectady, N. Y.

Existing Commercial Applications of Electrical Power from Niagara Falls, by W. L. R. Emmet, of Schenectady, N. Y.

Electric Power in Factories, by Prof. Francis B. Crocker, Messrs. Benedikt and Ormsbee, of New York.

Long-Distance Power Transmission at 10,000 Volts (the Pomona plant), by George Herbert Winslow, of Pittsburgh.

On Rating the Performance of Electric Power Plants and Transmission of Varying Loads, by Prof. Wm. S. Aldrich, of Morgantown, W. Va.

Work of the Westinghouse Electric and Manufacturing Co. for the Cataract Construction Co., of New York, by L. B. Stillwell, of Pittsburgh.

Engineers' Club of St. Louis.

The club met June 5, President Russell presiding; 18 members and 5 visitors present. The Executive Committee announced that arrangements had been made for a meeting of the club on June 19, on which date Mr. H. A. Wheeler will present a paper on "Vitrified Brick for Street Paving." Applications for membership were announced as follows: Clinton Kimball, Assistant Engineer Bell Telephone Co., of Missouri; John J. Lichter, Jr., Engineer Union Depot Railroad Co.; H. H. Sykes, Chief Engineer Bell Telephone Co., of Missouri. The Executive Committee was requested to extend, on behalf of the Engineers' Club of St. Louis, an invitation to the American Society of Mechanical Engineers to hold their spring meeting of 1896 in St. Louis.

Mr. Edward Flad addressed the club on the subject of stand-pipes, making special reference to a tower designed by him and just completed at St. Charles, Mo. Its dimensions were 25 ft. in diameter by 70 ft. high; capacity, 250,000 gals. It was encased in brickwork tied to the tower itself. The stand-pipe was stiffened by six circular girders, the object of which was to maintain the circular shape of the tower, so as to afford maximum strength to resist wind pressure. These girders were on the outside of the tank, occupying the space of 2 ft. between the tower itself and the casing. A stairway was also placed in this space. The stand-pipe was covered by a roof of iron and slate. Due attention had been given to architectural features. The cost of the stand-pipe was: For iron work, $4,450; brick work, $2,807; foundation, $6,77; total, $7,934. Mr. Flad also showed a tower design by him for Laredo, Tex. He showed stereopticon views of the St. Charles, Laredo, and other towers of recent design, as well as a number of towers which had failed. Messrs. Johnson, Holman, Baier, Bryan, Gayler, Moore and Crosby took part in the discussion.

Western Railway Club.

The regular monthly meeting of the Western Railway Club was held in the Banquet Hall of the Auditorium Hotel May 31, President Gibbs in the chair and 130 persons present. The Secretary and Treasurer presented his annual report. The club began the year with 250 members and now has 617, and the representation of other than the mechanical departments has very greatly increased. The attendance also has notably increased, the average being 125 at each meeting, running recently up to 150. The club has taken the first practical step in the inauguration of a radical reform in the interchange rules and the new Interchange Association is the direct outgrowth of this work. The club began the year with a heavy deficit, but now all debts have been cleaned up there are funds in hand more that sufficient to pay all current accounts. The total receipts during the year were $3,555.

The preamble and resolution adopted by the New York Railroad Club, appointing a committee to act with committees of other clubs, to devise arrangements for subscriptions to defray the expenses of entertainment at the mechanical conventions, were considered by the Executive Committee. The committee submits the communication to the club, with the suggestion that the club should express the opinion that, being an independent organization, it is not within its province to dictate to other organizations as to matters of policy which concern them alone. This expression of opinion from the Executive Committee was formally endorsed by the club.

A discussion on car heating was then taken up, and is reported on another page.

The following officers were elected for the next year:

President, G. L. Potter; *First Vice-President*, D. L. Barnes; *Second Vice-President*, A. M. Waitt; *Treasurer*, J. N. Barr; *Member Executive Committee*, Peter H. Peck. The new Executive Committee immediately met and appointed a secretary as follows: *Secretary*, Walter D. Crosman.

American Society of Mechanical Engineers.

Arrangements for the convention to be held at Detroit, beginning June 25, have been about completed. Special railroad rates have been secured to and from that place on the certificate plan; that is, at 1⅓ single fare. The Boston Passenger Committee, the Trunk Line Association and the Central Traffic Association roads have joined in the arrangement. Arrangements have been made for special cars, or if enough cars are filled for a special train from Philadelphia by the Lehigh Valley from New York over the West Shore and from Boston over the Boston & Albany. The New York and Boston cars will meet at Ravena near Albany, and the Philadelphia cars will join them at Buffalo. The headquarters in Detroit will be at the Russell House.

The programme is about as follows: Tuesday afternoon, June 25, a drive through Belle Isle Park. Tuesday evening, opening session, professional papers followed by reception and refreshments. Wednesday morning, business session, committee reports and general business, also professional papers and topical discussions; lunch at the new Chamber of Commerce Building; afternoon, professional papers and topical discussions; evening, reception by the citizens of Detroit at the Detroit Club. Thursday morning, professional papers and topical discussions; afternoon, excursion to Lake St. Clair and St. Clair river, with supper at St. Clair Flats. Friday morning, professional papers and discussions and business meeting; afternoon, an examination of various manufacturing establishments.

The papers promised so far include: The Strength of Iron as Affected by Tensile Stress While Hot, Professor Wood; The Effect of Length of Specimen on Percentage of Ductility, Prof. R. C. Carpenter; Efficiency of Boilers, F. W. Dean; Driving and Pulling Wire Nails, Professor Carpenter; New Forms of Friction Brakes. Professor Goss; A Horse Power Planimeter, E. T. Willis; A Coal Calorimeter, Professor Carpenter; Distribution of Moisture in Steam When Flowing in a Horizontal Pipe, Professor Jacobus; Analysis of Tremont Turbine, Professor Wood; Rustless Coating for Iron and Steel, Matthew P. Wood; A Piece-Rate System, F. W. Taylor; Down Draft Furnace for Steam Boilers, W. H. Bryan; A New Shaft Governor, E. T. Armstrong; A Method of Proportioning the Cylinders of Compound Engines, E. C. Knapp; Expansion Bearings for Bridges, George S. Morison; Experimental Engine Tests, Cornell University, Professor Carpenter; Tests of Electric Light and Railroad Station, Prof. D. C. Jackson; Pipe Covering Tests, George M. Brill, etc.

American Railway Master Mechanics' Association.

The following is the programme of business of the twenty-eighth annual convention:

President Garstang will call the convention to order at 9 a. m., Monday, June 17. The discussion of questions proposed by members is a special order from 12 o'clock to 1 p. m. of each day. Reports and committees are as follows:

No. 1. Exhaust Nozzles and Steam Passages—continued.—Robert Quayle, William Forsyth, James McNaughton, W. S. Morris, D. L. Barnes.

No. 2. Locomotive Fire Kindlers—continued.—John Hickey, J. O. Pattee, Geo. D. Brook, W. T. Reed, John A. Hill.

No. 3. Shop Tests of Locomotives.—William Forsyth A. S. Vogt, George Gibbs, D. L. Barnes, W. H. Marshall.

No. 4. Gauges for Sheet Metal, Tubes and Wire (Committee to confer with manufacturers and others, and to submit a practical system for adoption by the association).—Geo. R. Henderson, T. W. Gentry, C. F. Thomas, A. W. Gibbs, Alex. Gordon.

No. 5. Utilization of Railroad Scrap Material (Report on best method of handling the same).—H. J. Small, H. Monkhouse, Henry Schlacks, Geo. W. Smith, H. P. Robinson.

No. 6. Causes of Bulging of Firebox Sheets.—P. Leeds, John Hickey, John Ellis, A. E. Manchester, C. H. Baker.

No. 7. Best Material for Boiler Tubes and Specifications for Same.—T. A. Lawes, W. L. Gilmore, R. B. Redding, P. H. Peck, M. N. Forney.

No. 8. Piston and Piston-Rod Fastenings (with special reference to pistons of large diameter and light weight).—R. H. Soule, W. H. Thomas, William Swanston, J. D Barnett, C. Graham, Jr.

No. 9. Riveted Joints (to submit a set of proportions for riveted joints, representing most approved practice).—A. E. Mitchell, S. Higgins, Geo. W. West, H. D. Gordon, L. R. Pomeroy.

No. 10. Wear of Driving Wheel Tires (as affected by weight upon same).—W. H. Lewis, J. N. Barr, E. M. Herr, J. H. McConnell, Geo. F. Wilson.

No. 11. Transmission of Power (report on relative merits of pneumatic and electric transmission of power in railway shops).—T. B. Purves, Jr., John Medway, F. M. Twombly, C. E. Fuller, J. T. Gordon.

No. 12. Standard Size of Pamphlets, etc.—G. W. Rhodes, E. M. Herr, Allen Cooke.

Engineers' Club of Philadelphia.

A regular meeting of the club, the last before the summer recess, will be held on Saturday June 15, at 8 o'clock p. m. A description of the Philadelphia & Reading Coal Storage Plants will be read by William D. Beatty.

At the meeting on June 1, President George S. Webster in the chair, 41 members and visitors were present.

The special committee appointed to co-operate with the Committee on Standard Gages of the American Society of Mechanical Engineers, reported the communication sent to the latter as the result of their labors. The committee favored the adoption of the proposed decimal gage in which all small measurements are expressed in thousandths of an inch, but feared that an international system which should unify the two standards now in use—the inch and the meter—would not be practicable at present. It recommended that the work of the American Society's committee be continued to ascertain if international unity of method in measurements is possible. The committee also suggested that the use of the word "mil" be encouraged for expressing the thousandth part of an inch.

Mr. George H. Paine presented an interesting paper on manual interlocking for railroad switches and signals, illustrated by large charts. Mr. Paine gave a lucid description of the usual forms of apparatus, with explanations of the best practice. The discussion was participated in by Messrs. Leffman and Rondinella.

Mr. Emile Geyelin, visitor, gave a description of what he believed to be the first pair of turbines working on the same horizontal axis. These turbines were made by him in the year 1854 for a cotton mill at Palitas, Mexico. The problem was to build a 140-H. P. turbine under 160 ft. fall of water. After making the necessary calculations, the agreement was made to construct a pair of horizontal axis turbines, connecting them to a countershaft by means of spur wheels, to attain a speed of 185 revolutions per minute, the contract price being $2,300, or less than one-tenth of what the proprietor expected to spend in England for an overshot wheel. These turbines were 11 in. in diameter, and made 1,850 revolutions per minute. Their action was highly satisfactory, and several similar orders were afterwards filled.

The subject of the vacuum column and other details of turbines were discussed by Messrs. Troutwine, Birkinbine, Falkenau and others.

PERSONAL.

—Hon. William J. Coombs, member of the last U. S. Congress from Brooklyn, has been appointed Government director of the Union Pacific Railroad.

—Mr. F. B. Semple has been appointed City Passenger Agent of the Denver & Rio Grande at Denver. Mr. Semple was lately General Passenger Agent of the Union Pacific, Denver & Gulf.

—Mr. W. P. Siddons, Superintendent of the Car Department of the International & Great Northern, has resigned. Mr. F. Huffsmith, Master Mechanic, has been appointed to take charge of the car department.

—Capt J. S. Tebbits, Immigration Agent for the Denver & Rio Grande for many years, and one of the oldest passenger agents in time of service in the United States, has retired from service on account of age and ill-health.

—Mr. W. E. Williams, who has been in the office of the General Manager of the International & Great Northern, Mr. T. M. Campbell, has been appointed Purchasing Agent of the railroad, with headquarters at Palestine.

—Mr. George H. Houghton, of the Passenger Department of the New York & New England Railroad, has been appointed General Passenger & Ticket Agent of the Bangor & Aroostook in Maine. This will relieve General Manager Cram.

—Mr. Foster Crowell, M. Am. Soc. C. E., Consulting Engineer, has been retained by the Board of Park Commissioners of New York City to make an examination and report upon the Harlem River Driveway, generally known as "The Speedway."

—Mr. Fred E. Sommers, of Danville, Ill., Assistant Chief Engineer of the Chicago & Eastern Illinois Railroad, was instantly killed at Chicago Heights, on June 7. He fell from the rear end of a caboose as a train was backing, and three cars passed over him.

—Mr. Ralph Swinburn, who died at Charleston, W. Va., on June 7, at the age of 90, is spoken of as a contemporary of George Stephenson, the father of the locomotive. Mr. Swinburn served under Stephenson on the Liverpool & Manchester, and came to this country about 1850.

—Mr. John D. Fay died at his residence in Rochester, N. Y., June 6, aged 80 years. Mr. Fay was Resident and Division Engineer and Canal Comissioner in New York for a number of years and was nominated for State Engineer of Canals. In 1849 Mr. Fay was placed at the head of a party which was sent to make a survey of the Nicaragua Canal.

—Mr. F. C. Shepard, who has been General Agent of the Louisville & Nashville at New Orleans since 1890, has

been appointed General Freight Agent of the lines south of Montgomery, with headquarters at the latter city. This office has been vacant for a number of months since the death of Mr. Theodore Welsh, and Mr. Shepard was in the direct line of promotion to the position.

—Mr. C. B. Hibbard, General Passenger Agent of the St. Paul, Minneapolis & Sault Ste. Marie Railway, has resigned that office to accept the presidency of the Northern Adirondack road in New York. Mr. Hibbard has also resigned his position as General Passenger Agent of the Duluth, South Shore & Atlantic. Mr. Hibbard became Passenger Agent of the "Soo Line," July 1, 1890.

—Mr. G. P. Eaton, Assistant General Land Agent of the Northern Pacific at Tacoma, Wash., has resigned, to take effect July 1. He resigned just after General Land Agent Schultz's death, but has remained at the request of the officials until the investigation into Schultz's affairs was finished. The latter is shown to have been a defaulter to the amount of several hundred thousand dollars.

—Mr. R. C. Barnard, for a number of years assistant to Mr. M. B. Cushing, Engineer of Maintenance of Way of the Pittsburgh Division of the Panhandle at Pittsburgh, has been promoted to be Assistant Engineer on the Chicago Division, with office at Logansport, Ind. Mr. Barnard is a younger brother of Mr. J. A. Barnard, now General Manager of the Peoria & Eastern Division of the Big Four.

—Mr. Johns Hopkins Vice-President of the Huntington & Broad Top Railroad, in Pennsylvania, and a cousin of the philanthropist of that name, died at Philadelphia last week, aged about 37 years. Mr. Hopkins had recently become president of the Hestonville, Moncure & Fairmount Passenger Railway Co., an important Philadelphia electric street railroad, and he was a director in many financial and banking institutions in Philadelphia and Baltimore.

—Mr. J. Seaver Page, of New York, has been appointed a trustee of the New York & Brooklyn Bridge Railroad by Mayor Strong, of New York. He succeeds Mr. E V. Skinner, who has held that office for some years. Mr. Skinner is General Eastern Agent of the Canadian Pacific Railroad, with headquarters at New York City. Mr. Page, his successor, was for many years Secretary of the Union League Club, of New York, and has been prominent in political affairs. He is connected with the F. W. Devoe and C. T. Reynolds Co., of New York City, the large paint and varnish manufacturers.

—Mr. F. P. Papy has been appointed General Freight Agent of the railroads forming the Plant System, and will have charge of the freight department of those lines, succeeding Mr. C. D. Owens, who recently resigned as as Freight Traffic Manager, having held that office since 1884. Mr. Papy was formerly Division Freight Agent of the Plant System at Savannah, being appointed to that office in July, 1892. He has been connected with the freight department of the Savannah, Florida & Western since 1887, and at various times has been Assistant Traffic Manager and General Freight Agent of that railroad, which is the most important of the lines operated by the Plant System.

—Mr. Samuel M. Felton, formerly First Vice-President of the New York, Lake Erie & Western Railroad Company, and at present Receiver of the Cincinnati, New Orleans & Texas Pacific, and Vice-President of the Alabama Great Southern Railroad Company, is understood to have been offered the Presidency of the New York, Susquehanna & Western road, whose financial condition has been engaging a good deal of attention recently. Mr. Simon Borg, the present President, is a banker and in poor health, and is not able to give much attention to the company's affairs. He has expressed himself as ready to resign as soon as a successor is agreed upon. It is desired to elect to the office a practical railroad man.

—The Atchison, Topeka & Santa Fe has abolished the office of Superintendent of the Western Division, which was held by Mr. T. H. Sears, and the jurisdiction of that office has been transferred to Mr. Charles Dyer, General Superintendent of the Western Grand Division. Mr. Sears will continue in the service of the company, being transferred to St. Louis as Manager of the St. Louis, Kansas City & Colorado, a branch of the Atchison extending from St. Louis to Union, Mo., about 60 miles. This appointment, however, is only temporary during the absence of Mr. E. O. Faulkner, who has been detailed on special service. It is understood that Mr. Sears will be assigned to duties at St. Louis, but it is not yet announced what his new position will be.

—Captain R. L Cobb, Chief Engineer of the Ohio Southern Railroad and of the Cleveland, Akron & Columbus, died at Clarksville, Tenn., on June 3, aged about 54 years. Captain Cobb went to the Ohio Southern Railroad as Chief Engineer a few years ago to take charge of the construction of that line from Springfield to Lima, O., and he has had charge of various other branches and new construction work for the company in the last few years. In 1893 he became also Chief Engineer of the Cleveland, Akron & Columbus, which is operated by practically the same management as that of the Ohio Southern. Before accepting these positions Captain Cobb was with the Louisville & Nashville Railroad for a number of years as engineer in charge of construction work, and while with that company he built many important branches in Kentucky.

—Mr. G. W. Vaughn, Vice-President and General Manager of the Santa Fe, Prescott & Phœnix Railroad, has resigned both those offices. Mr. Vaughn went to the railroad as Chief Engineer in 1891, when it was being surveyed and has continued in charge of the surveys on the construction of the line since that time. He was appointed Manager when the first section of the line was opened for traffic and has had charge of the operation of the road in addition to his duties as Chief Engineer in charge of construction, until the road was completed to its terminus at Phœnix, Ariz. This point was reached a few months ago, and the construction being now entirely completed and the property in regular operation Mr. Vaughn has retired from the service of the company. Mr. R. E. Wells, formerly of Topeka, who has been in the office of the President for some time, has been appointed Assistant to the President and will have direct supervision of the operating department.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—The office of General Superintendent Charles Dyer, of the Western Grand Division, has been removed from Colorado Springs to Pueblo. T. P. Sears, Superintendent of the Western Division, with headquarters at Pueblo, goes to St. Louis as manager of the St. Louis, Kansas City & Colorado. Mr. Seers succeeds E. O Faulkner, formerly private secretary to the late Allen Manvel. The Western division of the road will be operated as heretofore, from Pueblo, but will be under the immediate direction of General Superintendent Dyer, in addition to his other duties.

Baltimore & Potomac.—The annual stockholders' meeting of the railroad was held at the Northern Central offices, Baltimore, last week, and the following officers and directors were re-elected: B. F. Newcomer, President; Frank Thomson, Wjlliam J. Sewell, Vice-Presidents; Robert W. Smith, Treasurer; James P. Kerr, Secretary and Auditor: Directors, Frank Thomson and R. D. Barclay, of Philadelphia; Col. John Cassels, of Washington; Samuel Cox, Jr., of Charles County, Md.; Robert C. Hall, Michael Jenkins and John B. Ramsay, of Baltimore.

Belton & Northwestern.—The directors of the railroad completed the organization of the company at Belton, Tex., last week, by electing the following officers: George C. Pendleton, President; J. Z. Miller, Sr., H. C. Denny and B. A. Ludlow, Vice-Presidents; Henry Austin, Secretary; J. Z. Miller, Jr., Treasurer; G. W. Tyler, General Attorney; N. K. Smith, General Manager.

Canada Southern.—The company held its annual meeting at St. Thomas, Ont., June 5. The following directors were elected: Cornelius Vanderbilt, William K. Vanderbilt, James Tillinghast, C. M. Depew, Charles F. Cox, Samuel F. Barger, Joseph E. Brown, Edward A. Wicks, and Nicol Kingsmill. Meetings of connecting railroads in Canada and the Niagara River & Grand Island Bridge companies were also held and the old directors re-elected.

Chicago & Eastern Illinois.—At the annual meeting of stockholders, held at Chicago, last week, the following directors were elected: H. H. Porter, M. J. Carpenter, O. S. Lyford, C. W. Hillard, Chicago; A. R. Flower, Henry Seibert, R. M. Hoe, New York; H. H. Stevens, George H. Ball, Boston, Mass., and J. G. English, Danville, Ill. The directors elected: H. H. Porter, Chairman of the Board; M. J. Carpenter, President; O. S. Lyford, Vice-President; C. W. Hillard, Second Vice-President and Treasurer; H. A. Rubidge, Secretary; H. J. Messing, Assistant Secretary; A. R. Flower, Assistant Tseasurer, New York. An executive committee was elected as follows: H. H. Porter, M. J. Carpenter, O. S. Lyford, C. W. Hillard and Henry Seibert.

Chicago & Northwestern.—The annual meeting of the stockholders was held in Chicago, June 6. C. H. McCormick was elected for one year to fill the unexpired term of Percy R. Pyne, deceased. Officers were elected as follows: Chairman of the Board, Albert Keep; President Marvin Hughitt; Vice-President, Secretary and Treasurer, M. L. Sykes; Assistant Secretaries and Treasurers, S. O. Howe and J. B. Bedfield; Executive Committee, Albert Keep, Marvin Hughitt, C. M. Depew, H. McK. Twombly, S. F. Barger, David P. Kimball, W. K. Vanderbilt and James C. Fargo.

Chicago, Rock Island & Pacific.—The annual meeting of the company was held in Chicago on June 5. Of the 461,560 shares, 305,947 were represented. The following named Directors, whose terms of office expired at this meeting, were re-elected: Hon. R. P. Flower, Benjamin Brewster, and Henry M. Flagler, of New York, and Hon. George W. Wright, of Des Monies, Ia. The officers elected for the ensuing year are as follows: R. R. Cable, President; Benjamin Brewster, First Vice-President; W. G. Purdy, Second Vice-President; W. H. Truesdale, Third Vice-President.

Cleveland, Akron & Columbus.—John Roach has been appointed Roadmaster of the road, with office at Columbus, vice J. F. Donelon, deceased.

Davenport, Clinton & Eastern.—The officers of this new company in Iowa are given below: L. N. Doms, President; G. H. Taylor, Vice-President; C. J. Moss, Treasurer, and D. Allen, Secretary. The general office is at Davenport, Ia., and the fiscal office is in the Goff Building, Chicago.

Duluth & Iron Range.—The following officers were elected at the annual meeting at Duluth, Minn., June 10: President, J. L. Greatsinger, Duluth; Vice-Presidents, C. W. Hilliard, New York, and Joseph Sellwood, Duluth; Secretary and Treasurer, C. W. Hilliard, New York; Assistant Secretary and Assistant Treasurer, A. J. Patterson, New York; Chairman Executive Board, H. H. Porter, Chicago; Directors, Charlemange Tower, Jr., Pittsburgh; P. H. Kelly, St. Paul; M. J. Carpenter and C. P. Coffin, Chicago.

Duluth, South Shore & Atlantic.—At the annual election of the company last week Directors were elected as follows: Gen. Samuel Thomas, Calvin S. Brice, John W. Sterling, Walter Watson, Thomas W. Pearsall and George H. Church, of New York; Lord Mount Stephen, of London; Sir Donald A. Smith, Sir William C. Van Horne and Thomas G. Shaughnessy, of Montreal, and W. F. Fitch, of Marquette, Mich.

International & Great Northern.—At a meeting of the Directors held in Palestine, Tex., June 1, the following officers of that road were elected: George Gould, President; S. H. H. Clark and H. B. Kane, Vice-Presidents; A. R. Howard, Secretary and Treasurer, and H. B. Henson, Assistant Secretary and Treasurer.

E. E. Calvin, the newly appointed General Superintendent has assumed his duties.

Klickitat Valley.—The incorporators of this company, organized at Goldendale, Wash., are: N. B Brooks, C. W. Smith, G. H. Baker, J. Nesbit, Jacob Richardson, J. B. Current, Peter Ahola, A. R. Graham and A. M. Balfour, of Goldendale, Klickitat County, Wash.

Mason City & Fort Dodge.—At the annual meeting of the company, held at Fort Dodge, Ia., on May 25, the following officers were elected for the ensuing year: M. C. Healion, President, St. Paul, Minn.; Hamilton Browne, Vice-President, Boone, Ia.; S. T. Meservey, Secretary and Treasurer, Fort Dodge, Ia., and C. C. Burdick, Assistant Treasurer, Fort Dodge.

Minneapolis, St. Paul & Sault Ste. Marie.—The annual election of directors and officers of the company was held in Minneapolis last week. Three new directors, W. B. Dean, of St. Paul; F. H. Peavey, of Minneapolis, and T. G. Shaughnessy, of Montreal, were elected. The old Board of Directors were re-elected. They are: John S. Pillsbury, C. H. Pettit, R. B. Langdon, John Martin, W. D. Washburn, Thomas Lowry, all of Minneapolis, and W. C. Van Horne, of the Canadian Pacific. The old officers were also re-elected, as follows: Thomas Lowry, President; Capt. John Martin, Vice-President; Charles F. Clement, Secretary and Treasurer; Charles W. Gardner, Auditor, and F. D. Underwood, General Manager.

T. A. Switz has been appointed Assistant to the General Manager in addition to his duties as Purchasing Agent, his office being at Minneapolis.

Mobile & Ohio.—The following appointments, designed especially to benefit the immigration to points along the line, have been announced: W. H. Harrison, Jr., District Passenger Agent, headquarters in Des Moines, Ia.; W. J. McLean, District Passenger Agent, headquarters in Chicago; M. H. Bohreer, District Passenger Agent, headquarters at Detroit, Mich.

St. Louis, Alton & Terre Haute.—M. B. Mann having resigned the office of Master of Transportation, that position has been abolished and the office of Trainmaster created. W. C. Sutherland has been appointed to that office.

Santa Fe, Prescott & Phœnix.—F. M. Murphy, President and General Manager, will hereafter, in addition to his duties as President, also perform those heretofore devolving upon G. W. Vaughn, Vice-President and General Manager, who recently resigned. Mr. R. E. Wells has been appointed Assistant to the President, with headquarters at Prescott, Ariz. T.

Union Pacific, Denver & Gulf.—General Passenger Agent Winchell annouces the abolition of the office of General Baggage Agent. Hereafter the general passenger department will receive all reports pertaining to the baggage department.

Wagner Palace Car Co.—H. W. Allen, of Chicago, has been appointed Assistant District Agent, with headquarters at Denison, Tex., vice A. LaCroix, resigned.

Winona & Southwestern.—The following officers were elected at Winona, Minn., last week: President, H. W. Lamberton; Vice-President, V. Simpson; Treasurer, M. G. Norton; Secretary, Thomas Simpson; Executive Committee, to serve with the officers, Earl S. Youmans, Charles Horton and W. H. Laird.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Bangor & Aroostook.—The survey of the Ashland branch has commenced, under the direction of W. Z. Earle, Assistant Engineer of the road. There will be two parties, the one on the southern end in charge of R. E. Cushing, and the northern party under C. LeB. Miles, who had charge of the Fort Fairfield branch last season. The southern party will survey from Oakfield to St. Croix lakes, 20 miles. The northern party will begin at these lakes and work northward to Ashland. This branch has been located previously, and the present survey is only a revision.

Belton & Northeastern.—The organization of this new company has been completed at Belton, Tex., as stated in this column last week, and George C. Pendleton has been elected President, and N. K. Smith General Manager. The directors propose to begin the preliminary survey of the railroad at once and expect to have the Chief Engineer selected within a few days. The line is to extend from Belton, a point on the Gulf, Colorado & Sante Fe, east of Temple, northeast to a connection with the St. Louis Southwestern at McGregor, near the town of Waco. The Gulf, Colorado & Sante Fe also reaches McGregor, this line extending south to Temple, which, as stated before, is a short distance east of Belton.

Bristol, Elizabethtown & North Carolina.—The sale of this road last week to the Pennsylvania Steel Co. is said to insure its early completion south to Ashville, N. C. It is now in operation between Bristol and Elizabethtown, Tenn., and is to be extended to Asheville from the latter place.

British Columbia Southern.—It is stated that the Canadian Pacific has withdrawn its objection to the building of a road through Crow's Nest Pass by this company, and that one of the directors of the latter company is now in New York negotiating with a syndicate to build the road. The British Columbia Southern Railroad has already been voted the Dominion subsidy of $3,200 a mile for thirty-two miles, and it is probable that the road will get a subsidy for the entire length.

Buffalo & St. Mary's.—A charter was granted to this company last week to construct a line from a point on the St. Mary's & Southwestern Road at St. Mary's, Elk County, to Ketner, on the New York, Lake Erie & Western Railroad and to Clermont, on the Western New York & Pennsylvania Road. The length of the line will be 30 miles, and the capital stock is $300,000. The directors are Andrew Kaul, B. Frank Hall, B. E. Mittendorf, John H. Kaul, G. C. Simons and J. M. Schaefer, of St. Mary's, and J. K. P. Hall, of Ridgeway, Pa.

Chicago, Burlington & Quincy.—It is stated that this company will build a short branch to the manufacturing village of Hanover, in Jo Daviess County, one of the northern counties of Illinois. The line, if built, will be a few miles long, extending from Hanover, south of Galena, on the C., B. & N., near the Mississippi River, east to the village. General Superintendent Hastings and other officers of the company recently visited Hanover in connection with this project, but it is not stated that they arrived at any decision in regard to building the branch.

Cleveland, Cincinnati, Chicago & St. Louis.—President Ingalls states that the Big Four trains will probably be running into Louisville, Ky., over the track of the Baltimore & Ohio Southwestern by July 1. He has agreed with President Bacon, of the latter company, upon the terms of a contract by which the Big Four trains will use the Baltimore & Ohio Southwestern tracks from North Vernon to Jeffersonville, a distance of 57 miles, but the details of this agreement have not been published, except that the Big Four company agrees not to do any local business between the two points. The Cleveland, Cincinnati, Chicago & St. Louis will now abandon the proposed parallel to extend its line into Louisville for which surveys had been made. It has ample terminal facilities in Louisville acquired during the past year and also controls the bridge over the Ohio River from Jeffersonville to Louisville.

Colorado, Wyoming & Great Northern.—The company is recording in Colorado a mortgage for $6,000,000 given to the Security Loan & Trust Co., of Philadelphia, of which Theodore Frothingham is President. The company proposes to construct a railroad between Grand Junction, Col., and Green River, Wyo. Work on the line north of Grand Junction, Col., was begun some weeks ago. W. T. Carpenter is President.

Farmington, Waterville & Wiscasset.—This project for a local railroad out of Waterville, Me., will probably be abandoned as the result of a vote in the latter city last week on the question of issuing township bonds to the amount of $50,000 in aid of the project. This was the second time that this proposition had been voted upon by the city, and both times it was defeated by considerable majorities. The company was organized by I. C. Libbey and W. F. M. Fogg, of Waterville, to build a railroad from the latter town to connect with the Wiscasset & Quebec Railroad now building, and thence to Farming-

ton, a distance altogether of about 30 miles. There is said to be little prospect of the road being built now that the projectors have failed to secure the local subsidies expected.

Gulf & Interstate.—The tracklaying on this Texas Railroad was begun at Beaumont, Tex., near the Sabine River, on May 31. This is part of the line being built through the Bolivar Peninsula from a point opposite Galveston, Tex. The length of this line is altogether about 60 miles and it has been graded for the entire distance, with the exception of something less than five miles of line. The rails and track material so far delivered at Beaumont will be only sufficient to lay a few miles of track. It is stated that additional material has been shipped. The work was begun at this time to meet the terms of an agreement made by the town of Beaumont, when $35,000 was subscribed in aid of the project. By that contract 30 miles of railroad is to be finished by Aug. 1.

Hocking Valley & Lake Erie.—The stockholders of the Columbus, Hocking Valley & Lake Erie Railroad Company have formally transferred the property of the company, the road now in process of construction, to the Hocking Valley & Lake Erie Railway Co. The price paid is given as $100,000. The project is for a line along the Hocking Canal from Columbus to Athens, O.

Indianapolis, Anderson & Marion.—President Noah J. Clodfelter, of Marion, Ind., states in a newspaper interview that the company has sold an issue of its bonds and secured funds to carry on construction work during this season. He also states that a contract has been made with the New York Standard Construction Co., to build a line from Marion south to Anderson, a distance of over 100 miles, by October next. This line would parallel the existing road of the Cleveland, Cincinnati, Chicago & St. Louis, which is very direct between the two towns. It seems hardly probable that a second line will be built in these times.

Kansas City, Pittsburg & Gulf.—The surveys for the extension of this railroad south of Siloam Springs, Ark., are now being made to and beyond the Arkansas River. The crossing of the river has been decided upon and an engineering party has just been organized to continue the surveys south of the river to connect with the section of railroad in operation north of Texarkana. Mr. Richard Gentry, the General Manager of the Railroad, has been at Fort Smith, Ark., recently arranging to build a branch of the line into that city. The main line south of Siloam Springs which has been located passes about 15 miles east of Fort Smith. The latter city desires to secure a connection with the railroad, but Mr. Gentry says that it will be impracticable to locate the main line through that town on account of the heavy grades and the increased cost of construction. He has agreed to build a branch from a point near the Arkansas River at a town called Redlands, into Fort Smith, if the town donates to the company sufficient ground for station and yard room in the town limits. This branch would be about 15 miles long.

Mineola & Pittsburgh.—This company has been organized at Mineola, Wood County, Texas, with a capital stock of $100,000. The following officers have been elected: B. F. Reed, President; W. B. Teagarden, Secretary; I. G. Bromberg, Treasurer. About $41,000 of the stock has been subscribed. The road is to extend to Pittsburgh, in Northeast Texas, near Texarkana. The distance is about 40 miles.

Missouri, Kansas & Texas.—The route for the cut-off branch to Holden, Mo., is understood to have been finally settled upon and some contracts for the grading have already been given out. Donald Jeffries, who has just completed the Southwestern Terminal branch in the Indian Territory, has a contract for part of the work on the line in Missouri. This line is called the St. Louis & Kansas City Cut-off and is being built to give the company a more direct line between Kansas City and St. Louis. The Holden branch begins at Paola, Kan., south of Kansas City, and terminates at Holden, leaving a gap of about 36 miles between that point and the main line near Sedalia. The line now being put under contract completes this gap, joining the main line at Green Ridge, a station just south of Sedalia. Beyond Sedalia connection will be made with the Missouri, Kansas & Eastern at New Franklin.

Moundsville, Wheeling & Benwood.—A charter was issued in West Virginia last week to this company, organized to build a railroad from Wheeling to Moundsville, W. Va., along the Ohio River. The principal office will be at Moundsville, and the incorporators are J. W. W. Burchinal, M. F. Cox and A. D. Pierce, of Moundsville; P. B. Dobbins, of Wheeling, and B. F. Peabody, of Glendale, W. Va.

Nantucket Central.—An act incorporating this railroad company to operate the railroads belonging to the Nantucket Railroad Company was passed at the recent session of the Massachusetts Legislature. The capital stock is $50,000, and the incorporators are B. B. Johnson, H. S. Milton, N. Warren, D. L. Weeks, M. M. Johnson, W. C. Parker, G. R. Taber, James Stevens and B. W. Gilbert.

Ohio River.—At a recent meeting of the directors of the Ohio River Railroad, from Wheeling to Huntington, W. Va., it was decided to fill in all trestles as rapidly as possible, and to substitute steel for wood in all the long trestles which cannot be filled in, and to begin at once on the policy of doing away with all wooden bridges, replacing them with steel. Within the past year about five miles of trestling have been filled in, and the work is progressing, and the recent order is to increase the rapidity with which the work is to be done.

Ottawa, Arnprior & Parry Sound.—There are now 1,800 men at work on the railroad west of Long Lake, Ont., between that point and Parry Sound. Over 1,000 men are employed on the first and second sections west of the present terminus. Six hundred are on the section at Parry Sound, which, when built, will open the Parry Sound Colonization, the western section of this road, through from the Grand Trunk to the Georgian Bay. Two hundred more men are engaged ballasting above Long Lake.

Pennsylvania.—Last week the construction of the new branch to the New Jersey coast at Beach Haven was begun. The road will start at Hancver Station, on the line of the Philadelphia & Long Island Branch Railroad, and cross through the pine woods, a distance of 21 miles, to Manahawkin, or the shore. It will be operated by the Pennsylvania Railroad Co., and will shorten the time to Beach Haven and other resorts on Long Beach fully a half hour from Philadelphia. This travel has been heretofore going over the Tuckerton Railroad.

Pennsylvania Midland.—Work was resumed on June 7 on the road from Bedford to McKee's Gap, Pa. Nothing has been done toward the completion of this branch since January last. The completion of the road is now under the direction of Theodore Gerrish, of Lewiston, Me., a director and leading stockholder. New contracts are being made. Five miles of track has been laid and the material for the entire branch is now on the ground. Three new engines have been ordered and are daily expected. An engineering party, in charge of U. S. Heck, has surveyed from Cessna to Osterburg, Pa. The completion of the branch from Osterburg into the hitherto undeveloped coal fields of Somerset County, at Ashtola, will be hurried forward. Hon. George B. Orlady, of Huntingdon, Pa., is President.

Philadelphia, Wilmington & Baltimore.—The Pennsylvania Railroad will build an extension of the Claymont branch of the Philadelphia, Wilmington & Baltimore road, from its present terminus to Naaman's Creek, near Dover, Del., a distance of one mile. This branch, which is used for freight purposes only, is a portion of the South Chester Railroad. The work upon this extension will be mainly trestling, and the contract has been awarded to Armstrong & Printzinhoff.

Pittsburgh, Monongahela & Wheeling.—The final surveys are now being made for this railroad under the direction of Mr. A. D. Neeld, Chief Engineer. The company was organized during the year by W. G. Dacey, of New York City, and others interested in coal lands in the Monongahela region of Pennsylvania, to build a railroad from the town of Monongahela through these coal lands to Wheeling, W. Va. The distance will be about 55 miles. The coal lands referred to are situated in Washington and Green counties, in Western Pennsylvania, most of the mines being owned by the Monongahela Coal Co., the controlling interest of which is nearly identical with that controlling the new railroad company. It is said that the company controls about 40,000 acres of coal lands in this region, and besides the coal properties there are extensive timber and agricultural resources which will be developed. The President is W. G. Dacey, of 40 Wall street, New York. C. C. Dodge, of New York, and George H. Anderson, of the Chamber of Commerce of Pittsburgh, are Vice-Presidents, and J. H. McCreary, formerly counsel for the Pittsburgh & Lake Erie Railroad, will be counsel for the new company.

Plateau Valley.—This company has been incorporated in Colorado with a capital of $250,000 by Fine P. Ernest, George W. Vallery and F. S. Rockwell, of Denver; P. S. Stephens, Montrose; Anson Adams, Jr., of Grand Junction, Col. The company has surveys already made of a proposed line from a point on the Rio Grande Junction Railroad, 20 miles from Grand Junction, up Plateau Creek to Buzzard Creek, a distance of 20 miles; thence over a divide to Rock Creek and the Roaring Fork. The company has obtained possession of some 20,000 acres of ranch lands, which are to be colonized immediately, while funds will be sought to construct the railroad into that country.

Quincy Quarry.—An act has been passed by the Massachusetts Legislature to authorize the Quincy Quarry Co. to construct a railroad in the city of Quincy, Mass., to transport granite from the quarries.

Racquette River.—The New York State Railroad Commissioners have fixed June 26 as the date upon which to hear arguments on the petition of this company for a certificate from the Commissioners to authorize the construction of the line. It is not expected that any opposition will be made to the granting of the necessary authority to build the railroad. It is projected by C. A. Arnold, of Albany, and others, and it is to be built from Tupper Lake, the southern terminus of the Northern Adirondack Railroad, and near the crossing of that line by the Adirondack & St. Lawrence Division of the New York Central Railroad, easterly along the Racquette River to the town of Axton, which is just south of Middle Saranac Lake. The length of the line will be about 10 miles.

Raleigh & Western.—Arrangements are understood to be now under way to complete this railroad from its present terminus to Asheboro, the county seat of Randolph County, N. C. The road is controlled by Philadelphia interests, the portion now built, about 30 miles, having been opened in 1893. It extends from Colon, a station on the Raleigh & Augusta Division of the Seaboard Air Line, west of Millane, leaving about 20 miles of road still to be constructed to reach Asheboro.

Rumford Falls & Rangeley Lakes.—The tracklaying on this narrow gage railroad in Western Maine, which is to reach the well-known Rangeley Lakes, was begun last week. The line is an extension of the Portland & Rumford Falls, north of Rumford Falls, the present terminus of that railroad, on the Androscoggin River. It has been graded as far as Houghtons, 18 miles north of the river crossing. The route follows Bradeen and Bemis streams to its terminus on one of the Rangeley lakes, about 10 miles beyond Houghtons. The survey for this latter section is in progress in charge of the Chief Engineer, Mr. R. B. Stratton. Two bridges 25 ft. and 30 ft. span are being built in the section now graded and will not delay the tracklaying. The latter work is being done by Caldwell & Varnum, a contracting firm of Vermont. Mr. Galen C. Moses, of the company, is President of the railroad. He proposes a further extension beyond the lakes to the north, which, however, has not yet been put in definite shape.

San Francisco & San Joaquin Valley.—Chief Engineer Story now has several parties of engineers on the surveys for this road south of Stockton, Cal. So far no surveys have been made north or east of the latter town. The first party of engineers which started out from San Francisco has surveyed beyond the Stanislaus River and expect soon to reach the Tuolumne River, which is 10 miles beyond the former river and about 30 miles south of Stockton. Two other parties of engineers are working in Kings and Fresno counties; one, under charge of A. R. Guppey, is working south from Fresno, through Hanford, and the other, in charge of E. E. Tucker, will run a line through Visalia. It is expected that these two lines being run south of Fresno will meet again at Tulare. The directors are letting contracts for various parts of the construction work from week to week. The Baldwin Locomotive Works have been given an order for three locomotives, and contracts for 300,000 ties have been let to L. A. White, of Stockton. Several shipments of rails have been made from New York, and are expected to reach San Francisco this month.

Santa Fe & Cochiti.—This company has organized by electing E. H. Bergmann, of Santa Fe, N. M., President; Samuel Elliot, Vice-President; James H. Purdy, Secretary, and Hermann Claussen, Treasurer. German capital is said to have been enlisted to build the road from Santa Fe to White Rock Canon, the Cochiti mining district, 35 miles, and also to dam the Rio Grande to White Rock Canon for power and irrigation purposes. Engineers will commence finally locating the road next week.

Terre Haute, Saylor Springs & Mount Vernon.—Horace C. Pugh, of Terre Haute, Ind., has been appointed General Manager of this railroad, with headquarters at Terre Haute, Ind. At a recent meeting of the directors it was decided to construct the line from Mount Vernon, Ill., to the Indiana state line. The officers will be ready in a short time to contract for the construction of the division in Illinois. The company will soon organize under the laws of Indiana for the purpose of building from the state line to Terre Haute and bridging the Wabash River.

Valley Terminal.—Surveyors are at work and the right of way is being purchased for this road, which is to extend from Neenah to Green Bay, a distance of 38 miles. It will parallel the Chicago & Northwestern from Appleton to Kaukauna and the St. Paul to Green Bay. The company is capitalized at $750,000 and John J. McIntyre, of Niagara Falls, is the President, and D. C. Dunlap, of Chicago, is Chief Engineer, his headquarters being at present at Appleton, Wis. The road is to extend through the Fox River Valley manufacturing district and was originated by the American Timber Co., which supplies the pulp mills in this district with spruce timber.

Wheeling & Lake Erie.—It is announced that the company will soon commence work on the extension of its line from the present terminus at the upper end of Martin's Ferry, O., on the Ohio River, to Bridgeport, O., three miles below. About a year and a half ago the company secured the right of way for this extension, the intention being to reach several large manufacturing establishments along the line which are now inaccessible to the Weeling & Lake Erie. There is but little grading to be done, but a good part of the extension will have to be built on trestles.

GENERAL RAILROAD NEWS.

Bristol, Elizabethton & North Carolina.—The railroad has been sold at receiver's sale to the Pennsylvania Steel Co. for $178,000. The road is in operation from Bristol to Elizabethton, Tenn., a distance of 16 miles, and, it is stated, will now be extended to Asheville, N. C.

Central of Georgia.—Messrs. Thomas F. Ryan and Samuel Thomas announced last week that a plan had been agreed upon for the reorganization of the company. It provides for the sale of the properties under foreclosure of the consolidated or tripartite mortgages or both and the sale of the securities pledged for the floating debt. The purchasers will organize a new company to be called the Central Railway Co. of Georgia The new company will be authorized to issue $7,000,000 first mortgage 50-year 5 per cent. gold bonds, $13,000,000 consolidated mortgage 50-year 5 per cent. gold bonds, $4,000,000 50-year 4 per cent. general mortgage gold bonds, a first lien on the Savannah & Western and Macon & Northern, $5,000,000 first preference income bonds, a lien on the Savannah & Western, Chattanooga, Rome & Columbus, Macon & Northern and Savannah & Atlantic roads, $8,500,000 second preference income bonds, $4,000,000 third preference income bonds, and $5,000,000 of common stock. The Ocean Steamship first mortgage bonds, amounting to $1,000,000, and the collateral trust mortgage of $4,880,000, will remain undisturbed. The Mobile & Girard mortgage is to be foreclosed and the bonds exchanged at par into 5 per cent. bonds under a new mortgage for $1,000,000. The purchasers under the foreclosure sale will agree to free the property of the Savannah & Western and the Chattanooga, Rome & Columbus from any claims of indebtedness to the Georgia Central, and also to pay the underlying bonds issued by the Columbus & Western Railroad Company of $800,000 and the Rome & Carrollton bonds of $150,000. They will also pay all the expenses of the reorganization, all of the secured floating debt of the Georgia Central, tripartite bonds with interest, and the ascertained debts of the receiverships.

The plan has been underwritten by a strong syndicate, and its success is considered assured. It is approved by the holders of a majority of the capital stock of the company, by various bondholders' committees, by the Richmond Terminal Reorganization Committee and the Southern Railway. The fixed charges under the plan are reduced to $1,815,000 a year.

Chattanooga Union.—This railroad is advertised to be sold on June 17 at Chattanooga. There are about 44 miles of track, with terminals in the business part of the city, the branches reaching every part of the city's manufacturing districts.

Chicago & Northwestern.—The directors have reduced the semi-annual July dividend on the common stock to 1½ per cent. In January 2½ per cent. was paid; from 1886 to 1894, inclusive, 3 per cent. semi-annually; in 1886, 6½; prior to that, 7. A resolution adopted by the directors states that surplus earnings for the full fiscal year ending May 31, after providing for the preferred stock dividend, leave within a fraction of 4 per cent. on the common stock, which amount has now been declared in the two semi-annual dividends. A dividend of 1¾ per cent. was declared on the preferred stock.

Cincinnati Southern.—The trustees recently engaged Mr. G. Bonscaren, of Cincinnati, to make an examination into the condition of this road. His report is just published and is a valuable document and shows that the property has been well managed by Receiver Felton and the C., N. O. & T. P. Co. The main line is 333 miles long and 60-lb. steel rails are laid on 261.81 miles, 75-lb. rails on 73.30 miles and 85-lb. rails on 0.81 miles and 75-lb. rails are being distributed to take the place of the 60-lb. rails. The intention is to lay 42 miles this year. Interlocked signals have been put in at all railroad crossings. All telegraph stations have been equipped with semaphore signals at the stations and most of them with distance signals also. The average length of service of ties in the track has been 7.24 years. Gravel ballast is used on 75 miles, furnace slag on 86 miles and broken rock on 175 miles. All wooden bridges have been replaced by iron or steel structures, and about three-fifths of the wooden trestles have been filled or replaced with structures of iron and masonry. Fifty-three intermediate stations, or one for about every seven miles average distance, are provided with combined freight and passenger stations. Water columns have been provided at the most important stations and with a few exceptions old tanks have been replaced with 50,000-gal. tanks. Electric light plants have been built at Ludlow, Oakdale and Chattanooga. Since the beginning of the lease in 1881, the cost of the betterments to June 30, 1894, have been $2,204,477, about two-thirds of which was for track and roadbed.

The amount of the equipment at the beginning of the lease in 1881 and on June 30, 1894, is as follows:

	1881.	1894.	Increase.
Locomotives	55	104	49
Passenger, baggage and express	38	66	28
Freight cars and cabooses	1,482	3,877	2,395

Locomotives of increased weight and power have been procured for passenger service as well as for freight service, the capacity of freight cars has been increased from 30,000 to 50,000 and 60,000 lbs. The amount paid by the C., N. O. & T. P. Company to the Cincinnati Southern Railroad Company and the trustees for their equipment in 1881 was $1,865,773. The cost of additional equipment has been $1,161,539. The total capital invested is $3,027,313.

The figures for the period of 13 years and 8½ months, embraced in the report, are:

Gross receipts	$43,635,367
Operating expenses, taxes	29,941,041
Net receipts	13,694,319
Cash rental	11,370,430
Cost of betterments	2,204,477
Total paid by lessees	13,574,907
Balance	$119,411

Evansville & Richmond.—Harvey Fisk & Sons inform holders of Evansville & Richmond Railroad bonds that the settlement with the Evansville & Terre Haute Railroad, which the firm proposed last winter, has been approved by the directors and stockholders of that company and has been accepted by the holders of $1,225,000 of Evansville & Richmond bonds. The settlement is therefore declared operative.

Georgia Southern & Florida.—The Southern Railroad Co. has acquired control of this railroad through purchase of a majority of the bondholders' committee's certificates. President Spencer states that the acquisition was made chiefly because the line will greatly facilitate the traffic of the Southern Railway's Western system. The Georgia Southern & Florida owns from Macon, Ga., southeast to Palatka, Fla., 285 miles, and operates the Macon & Birmingham, 95 miles. In 1891 Mr. Willis B. Sparks, who was President of the railroad, as well as of the construction company, while it was building, was appointed Receiver. A bondholders' committee was appointed, and a majority of the bonds has been deposited with the Mercantile Trust & Deposit Co., of Baltimore. The road was sold in foreclosure April 2, 1895, to Mr. Skipwith Wilmer, for the bondholders' committee, for $3,000,000. The reorganization plan provides for $4,000,000 of first five per cent. bonds, $684,000 first preferred five per cent. stock, $1,015,600 second preferred five per cent. stock and $4,000,000 common stock. The first and second preferred are issued to represent over-due coupons and the reduction of interest rate of the new bonds to five per cent.

Little Rock & Pacific.—The foreclosure sale of the railroad, under the decree of the United States court, fixed for June 17, has been postponed for the third time, and the date now fixed is Oct. 15.

Marietta & North Georgia.—Judge Newman, in Atlanta, Ga., has granted a second decree of forclosure in the case of the Central Trust Co. of New York against the railroad which is a line extending from Marietta in North Georgia to Knoxville, Tenn., over 215 miles. It was completed in 1890 through to Knoxville. In February following J. B. Glover was appointed Receiver and he has since operated the road.

Mexican National.—The company has made an arrangement with the Government of Mexico for conversion of the remaining $3,335,685 of the company's subsidy. The subsidy certificates, which should have been redeemed from import duties up to August, 1893, are to be at once converted at par. The balance is to be discounted at the rate of 7½ per cent. a month, on the basis of a monthly yield of $80,000 from the 6 per cent. yield on import duties. For the entire amount thus found to be due the bondholders of the company are to receive 5 per cent. interior redeemable debt bonds at 72. A similar compromise is made with the Mexican National Construction Co. The arrangement is along the same lines as that made a few years ago with the Mexican Central.

Michigan Central.—The stockholders, at a recent annual meeting, adopted resolutions authorizing the directors to enter into agreements with the Toronto, Hamilton & Buffalo Railroad, in Ontario, and the Leamington & St. Clair, also in Ontario, for the closer operation of those short branch roads with the Michigan Central. The Toronto, Hamilton & Buffalo has been built as an independent line, but the Leamington & St. Clair is one of the present operated lines of the Michigan Central. It extends from a point on the main line of the Canada Southern east of Windsor south to a point on Lake Erie, and is about 16 miles long. In 1889 it was leased to the Canada Southern for a term of 15 years at an annual rental of $6,000 for the first five years and at a higher rental for each of the next five years of the contract.

New Orleans & Southern.—Joseph Price, of London, President of the company, has filed a suit in the United States Circuit Court at New Orleans, La., against this railroad, asking that a receiver be appointed, as the railroad is insolvent. The company owns 65 miles of railroad south of New Orleans, on the east side of the Mississippi River. The New Orleans, Fort Jackson & Grand Isle road parallels it on the opposite side of the river and extends below it to near Fort Jackson. The company has a mortgage indebtedness of about $1,250,000. The Central Trust Co. of New York is trustee of the mortgages. Seven of the nine directors of the company live in England.

New York & New England.—The amended bill providing for the reorganization of the railroad was passed by both Houses of the Massachusetts Legislature last week and was signed by the Governor. This was the last legislation required by the Reorganization Committee. It is formally announced that the road will be sold under foreclosure of the second mortgage on July 9, at Hartford, Conn.

Oregon Short Line & Utah Northern.—The recent decision of Judge Merritt, United States Circuit Court, at Salt Lake City, in the application of the American Loan & Trust Co., of Boston, for a separate Receiver for this property seems to have the effect of seriously complicating the receivership situation. Judge Merritt appointed John M. Egan and W. H. Bancroft joint-receivers for the Utah division of the company. Mr Egan had previously been appointed sole Receiver by Judge Sanborn, at St. Paul, and Judge Gilbert, at Portland, Or., for the other divisions of the line. By the terms of the orders of those courts Mr. Egan was not to assume control of the property as Receiver until the American Loan & Trust Co., upon whose application the appointment of an independent Receiver was made, has provided funds for the payment of the overdue first-mortgage interest, which amounts to something over $1,000,000. The appointment of the present receivers of the Union Pacific as receivers of the Oregon Short Line & Utah Northern was made upon the application of first mortgage bondholders, upon default of the interest payments on those bonds. The American Loan & Trust Co., of Boston, is trustee for the second mortgage bondholders and the petitioner in the various suits for a separate Receiver. Both Judges Gilbert and Sanborn, in addition to naming John M. Egan as separate Receiver, providing the provision in relation to the payment of the first mortgage interest was met by the second mortgage bondholders, authorized the issue of Receiver's certificates to a sum amounting to $1,500,000. This would have permitted the second mortgage bondholders to secure the funds necessary to pay the interest in accordance with the decrees. Judge Merritt, however, made no order on that portion of the American Loan & Trust Co.'s petition asking for authority to issue Receiver's certificates. His failure to do so was taken as a decision on his part that this authority should not be granted. Without the authority to issue certificates the Trust Company would be unable to secure the funds to pay the overdue interest. It has since been stated that Judge Merritt was not opposed to giving authority to issue the Receiver's certificates as requested and would take action to that effect if separate application was made to him. It is stated, however, that the American Loan & Trust Co. is not likely to make further application or to assume the operation of the railroad if Mr. Bancroft, who is General Superintendent of the Union Pacific in charge of the Oregon Short Line, is continued as joint Receiver, even though he would have jurisdiction only in Utah.

Pittsburgh, Akron & Western.—Senator Calvin S. Brice has secured control of this property, which was recently sold at foreclosure to the creditors of the company, from whom the purchase has been made by Senator Brice. Hereafter it will be operated in connection with the Cincinnati, Hamilton & Dayton, the Wheeling & Lake Erie, the Lake Erie & Western, in which Senator Brice is actively interested, and all of which connect with the line. The company operates 165 miles of railroad between Delphos, in Western Ohio, near Lima across the state to Akron, south of Cleveland.

Providence & Springfield.—The stockholders of this railroad, which is a leased line of the New York & New England, extending from Providence, R. I., northwest to a connection with the New York & New England at Douglas, Mass., 30 miles, are offered $90 a share for their stock by the Union Trust Co., of Providence, R. I. President B. F. Vaughan announces that the largest stockholders of the company have already sold their stock at that price to a syndicate friendly to the present Reorganization Committee of the New York & New England Railroad. There are outstanding 5,170 shares of stock. The New York & New England at present owns a majority of the stock, and guarantees the bonds, which amount to $750,000.

Sioux City & Northern.—The ruling of Judge Shiras, on the petition of intervention of the Terminal Railroad & Warehouse Co., in the Sioux City & Northern receivership case has been filed at Sioux City. Some months ago the Manhattan Trust Co., trustee for the holders of $1,250,000 of first mortgage bonds against the Sioux City & Northern began proceedings for a foreclosure against the road. Soon afterward the Terminal Company put in a petition of intervention for $135,000, on the ground that the road had for a long time had the use of its terminal facilities and was delinquent in its rent to that amount. It asked that its lien be made prior to the bondholders' claim, and the court holds that the bonds come first. The case will likely be appealed.

Texas, Louisiana & Eastern.—The foreclosure sale of this railroad, after having been postponed several times, took place on June 4 at Conroe, Tex., under the order of Judge Bryant, of the United States Circuit Court. The property was sold to W. A. Kincaid, of Galveston, for $101,000. The property includes a constructed railroad of about 30 miles from Conroe, a point on the International & Great Northern, and the Gulf, Colorado & Santa Fe east through valuable timber lands in Eastern Texas toward the Trinity River. The present end of track is about seven miles east of the river, but the line has been graded up to the river. The road was constructed in 1892 and 1893, but for the last year and a half has been operated by receivers.

Toronto, Hamilton & Buffalo.—The stockholders of the Michigan Central Railroad, at a recent annual meeting at St. Thomas, Ont., authorized the directors to make an agreement with the Toronto, Hamilton & Buffalo for the interchange of traffic. Just what form this contract will take is not announced. The Toronto, Hamilton & Buffalo is a railroad which has been in operation for a year or two between Waterford and Brantford, Ont., 18 miles. Within a few weeks the company has opened another section from Brantford east to Hamilton, a distance of something over 35 miles, and trains are now running between Waterford, where the road connects with the Michigan Central north to Brantford, and thence easterly to Hamilton, Ont. It is stated in the newspapers that an agreement has been made by which the railroad will be operated jointly by the Michigan Central and Canadian Pacific railroads. In carrying out this plan the Toronto, Hamilton & Buffalo will build about 20 miles beyond Hamilton to a connection with the Canadian Pacific at Cooksville, Ont., the track of the Canadian Pacific being used from that point into Toronto. This will give the Michigan Central a line into Toronto and the Canadian Pacific an entrance into Buffalo via Welland.

Union Pacific, Denver & Gulf.—The business of the line is reported to be steadily gaining on every portion of the line excepting, probably, the Cheyenne Northern branch. The heaviest shipments of stock from the South ever known in the history of the road are now moving northward, the mining business of Central City and Black Hawk is better than in previous years, while the coal business in Las Animas County furnishes a steady traffic. The construction of an independent line from Trinidad into Walsenburg was the means of greatly reducing the rental charge between Pueblo and Trinidad, as by the recent trackage agreement which has been made by the Denver & Rio Grande the latter company now receives but $1,000 a mile rental.

TRAFFIC.

Traffic Notes.

Through passenger fares over the Seaboard Air Line were restored to the regular tariff rates on June 10.

The payment by the railroads of cartage charges on freight brought to the freight houses by shippers, which seems to be the favorite method of rate cutting at New Orleans, has again "broken out" at that city. On June 1 the Illinois Central was paying 40 cents a load for vegetables, which was said to be a trifle more than the Queen & Crescent was willing to pay.

The climate and resources of California were the subject of an address delivered before the Car Accountants' Association in San Francisco, April 17, by General N. P. Chipman. Mr. Chipman stated that the number of cars of fruit shipped out of California in 1880 was 546; in 1890 it was 20,706, including 2,968 of wine and brandy, and in 1894 the total was 40,912, in addition to 2,802 carloads shipped by sea. Since 1890 the empty car movement on the transcontinental railroads has been westward. The shipments by rail in 1894 were divided as follows:

	Carloads.
Green deciduous fruits	8,978.1
Citrus "	5,896.3
Dried "	5,124.8
Raisins	4,690.8
Nuts	392.9
Canned fruits	5,265.2
Wine and brandy	6,196.0
Vegetables	4,365.6
Total	40,911.7

Indictments for Underbilling.

Through the efforts of the Western Railway Inspection and Weighing Association, a federal grand jury has indicted the Buerger Reinig Co., of Fon du Lac., Wis., for a violation of the Interstate Commerce Act, in furnishing false weights, thereby securing underbilling. According to reports, this firm, with others, has had an agreement whereby its shipments were not weighed and inspected, the weights on shipping bills being accepted. The officials of the association became suspicous, and quietly caused some of the fiirm's cars to be weighed and discovered the fraud that was being perpetrated.

Chicago Traffic Matters.

CHICAGO, June 12, 1895.

All-rail shipments eastbound last week showed a gratifying increase all along the line, not being confined to any particular commodity. Lake shipments also increased largely, including 445,976 bu. wheat, 1,678,338 bu. corn, 1,727,362 bu. oats and 24,100 bbls. flour. There is some claim, however, that the all-rail lines are making concessions that take some business that should go to the lake and rail lines, especially to New England points. I do not think there is much basis for this charge.

The eastbound freight situation is still in an unsettled state, owing to what the newspaper men are pleased to call "a collapse of the money pool." It would hardly be true to say, however, that affairs are in any worse shape than they have been, for all the lines except the Big Four manifest a disposition to continue the agreement for a physical division of tonnage, the only question on which they differ being the best way to settle up the overs and shorts. Efforts are being made to get President Ingalls of the Big Four to join a new agreement, but they do not seem to amount to much as yet, and the whole matter has been referred to a committee to report some time during the present month, the report to present a plan for securing the division either by a money penalty, or in some other manner. The traffic men all recognize the fact that the present and all future agreements that may be made are but makeshifts for the purpose of preventing a general demoralization in rates and that no agreement short of an actual money pool will ever fill the bill and be lived up to in its spirit and letter.

Lake passenger traffic opened this week with a bright prospect for a good season's business. The lake boats have been refitted in many instances, and all the lines will cater to the excursion business more than ever.

A large party of railroad officials and friends left here on the steamer North West, the guests of the Minnesota Iron Company, last Friday for a trip to Duluth and to the mines of the company, returning by special train today.

Rates between Chicago and the Missouri River show no marked change, either for the better or worse. Another meeting was held last Thursday, but no result was reached, the general opinion being that it would be better to wait for the assent of the lines voting conditionally for the proposed amendment to the agreement providing that the question of percentages be left to arbitration. It is expected that the votes of these lines will have been received before the end of this week. In the meanwhile the lines are pretending to work under the old agreement.

The Texas rate situation has assumed a critical aspect, as predicted in my dispatch several weeks ago. The manipulation of rates by some of the lines has forced the Atchison and the 'Frisco to openly reduce tariffs to Texas points, and these roads threaten still further reductions unless their competitors stop their secret cutting of rates. A significant statement is printed on the reduced tariffs, to the effect that the new rates are not considered a fair compensation for the service, but are forced upon the issuing roads by the excessive competition of other lines. The issuing of these tariffs was preceded by a notice of withdrawal of the Atchison lines from the Southwestern Traffic Association.

The one-way passenger rate of $4 between Chicago and East St. Louis will be withdrawn to-morrow. This rate, established May 29, was only another exhibition of folly brought about by the action of one of the lines in granting half rates for an excursion party in opposition to the other lines. This was possible because there is no binding agreement now operative in Western territory.

The Executive Committee of the northwestern lines met last week, but accomplished nothing, nor is anything likely to be accomplished until the Western situation as a whole is taken in hand.

Rates on packing house products to the seaboard are now greatly demoralized, 15 cents being accepted in some cases.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending June 8, amounted to 51,718 tons, against 38,909 tons during the preceding week, an increase of 6,809 tons, and against 53,867 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	WEEK TO JUNE 8.		WEEK TO JUNE 1.	
	Tons.	p. c.	Tons.	p. c.
Michigan Central	3,493	6.8	2,542	6.5
Wabash	4,376	8.5	1,871	4.8
Lake Shore & Mich. South.	6,131	11.9	3,999	10.2
Pitts., Ft. Wayne & Chicago	7,838	15.1	7 995	20.5
Pitts., Cin., Chi. & St. Louis.	5,981	11.5	3.116	8.1
Baltimore & Ohio	5,402	10·4	4,007	10.3
Chicago & Grand Trunk	5,241	10.1	5,452	14.0
New York, Chic. & St. Louis	5,426	10.5	3.281	8.4
Chicago & Erie	5,590	10.8	3.846	9.9
C., C., C. & St. Louis	2,237	4.4	2,800	7.3
Totals	51,718	100.0	38,909	100.0

Of the above shipments 2,256 tons were flour, 21,142 tons grain and mill stuff, 8,386 tons cured meats, 8,549 tons dressed beef, 2,339 tons butter, 1,172 tons hides, and 6,443 tons lumber. The three Vanderbilt lines carried 29.2 per cent.; the two Pennsylvania lines 26.6 per cent.